THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXXII. No. 1837.] LONDON, JULY 26, 1898. [50TH YEAR. PRICE 6d.

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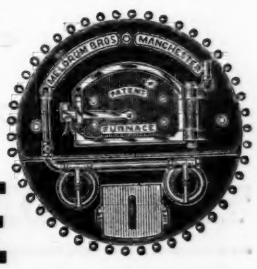

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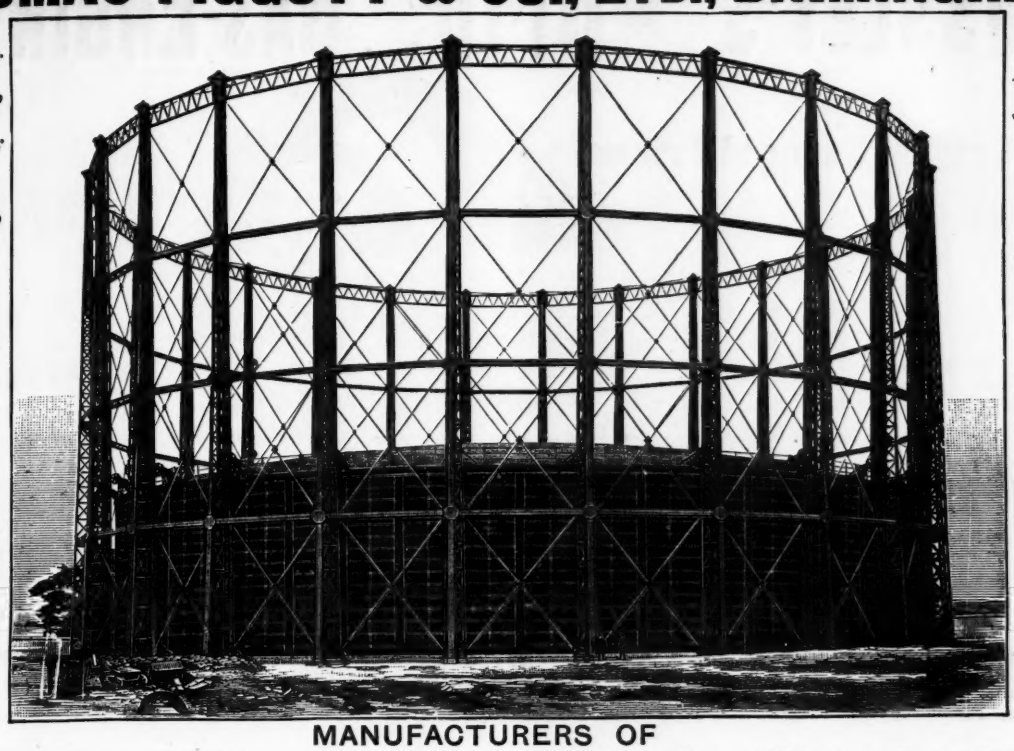

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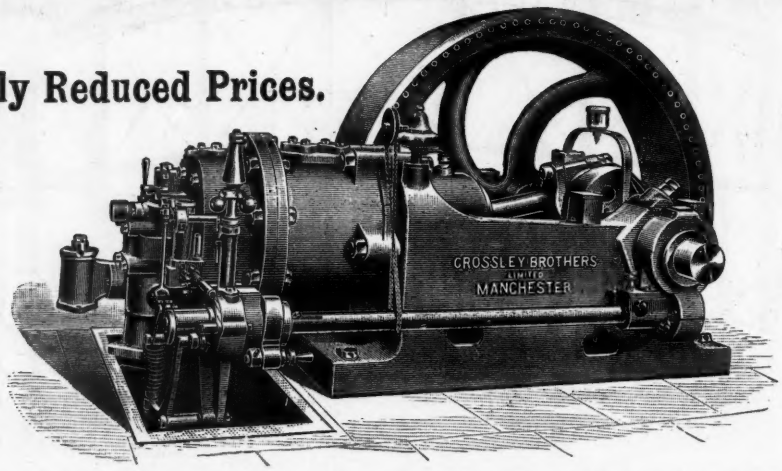

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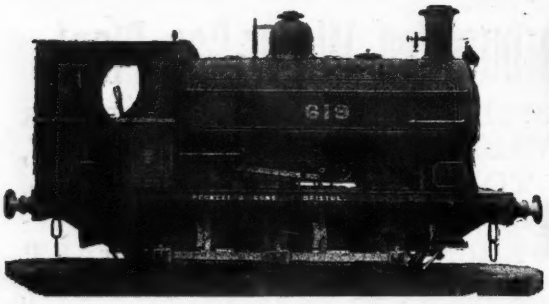

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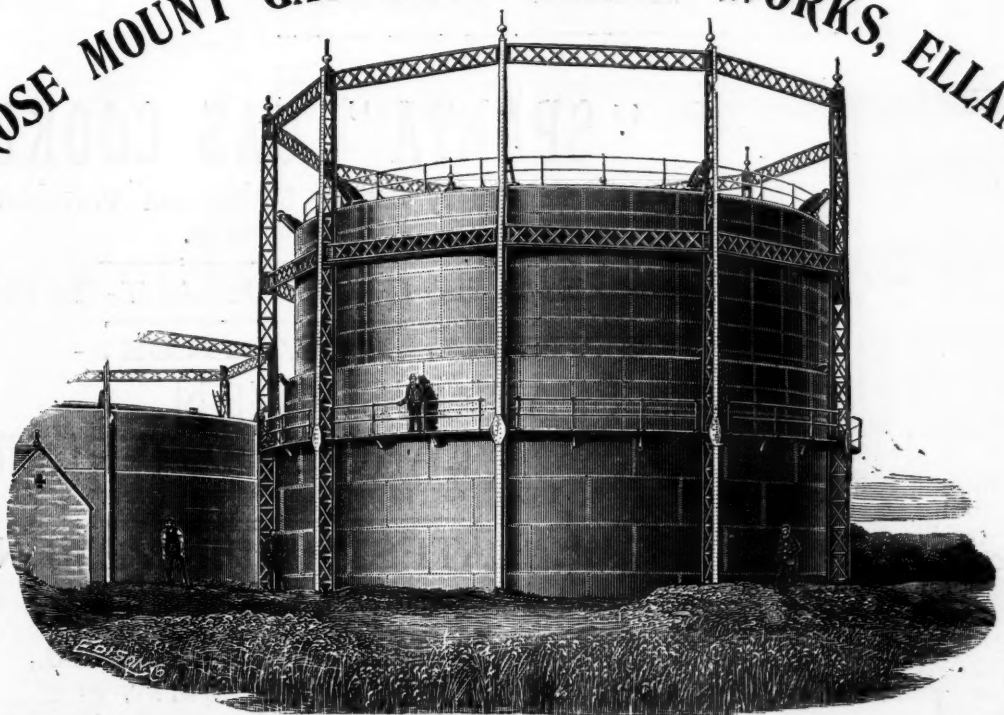

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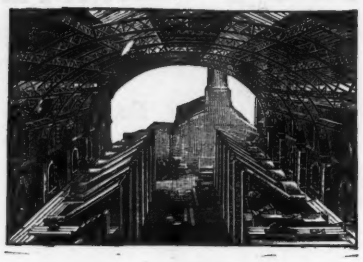

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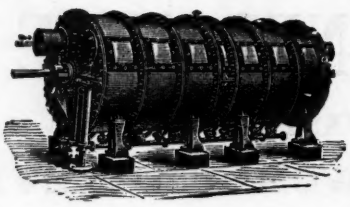

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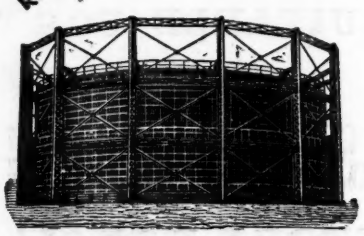

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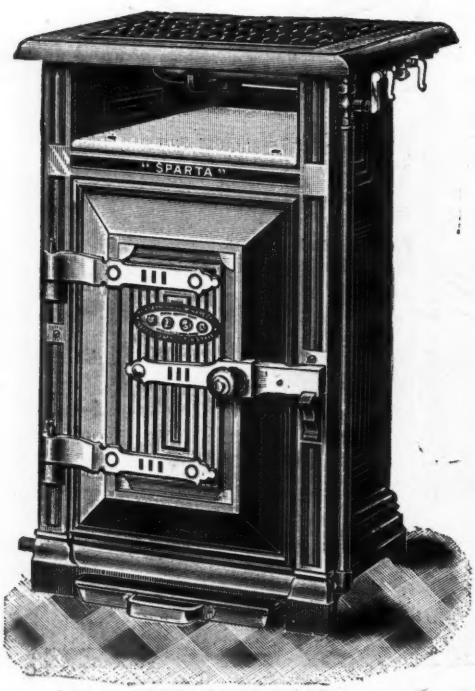

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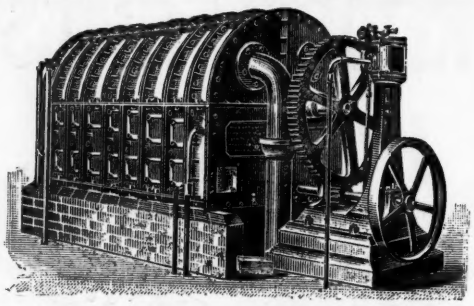

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Brussels	700,000	Syracuse, N.Y.	850,000
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Liverpool	3,500,000	Commercial Gas Co.	850,000
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Tottenham	750,000	Commercial Gas Co. (Third Contract)	1,250,000
Tottenham (Second Contract)	750,000	Bridlington	125,000
Santiago	400,000	Middlesbrough	1,250,000
Swansea	750,000	Croydon	1,250,000
Manchester	3,000,000	L. & N.W. Railway, Crewe	700,000
Brighton	1,750,000	Taunton	225,000
Preston	1,500,000	Lawrence, Mass.	400,000
New York	1,200,000	Rotterdam	850,000
Southport	750,000	Dorking	125,000
Bath	1,000,000	McKeesport, Pa.	500,000
Newburgh, N.Y.	350,000	The Gaslight and Coke Co., Bromley	3,750,000
Newburgh, N.Y. (Second Contract)	250,000	The Gaslight and Coke Co., Nine Elms	2,750,000
Hoylake	125,000	Durham	200,000
Coventry	600,000	New York (Remodelled)	11,000,000
Coventry (Second Contract)	600,000	Scarborough	800,000
Bordentown, N.J.	125,000	Perth, W.A.	125,000
Winchester	200,000	Bremen	550,000
Shanghai	225,000	Maidenhead	225,000
Stockport	500,000	Epsom	225,000
Norwich	1,000,000	North Middlesex	150,000
Holyoke, Mass.	600,000	Wandsworth and Putney	1,800,000
St. Joseph, Mo.	750,000	Aarhus	800,000
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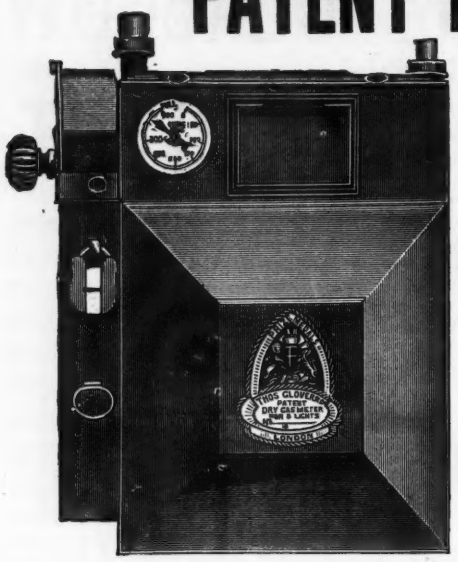

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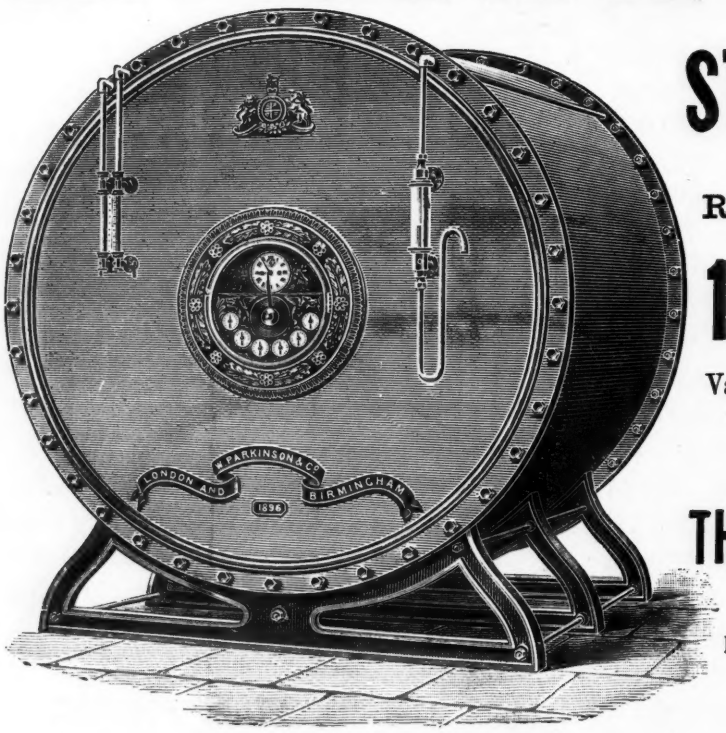

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IN

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OVER

1000 STATION METERS,

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EDITORIAL NOTES.

Lamp Accidents and the Flash-Point.

AN instructive commentary on the findings of the Petroleum Committee is supplied by the newspaper reports of a lamp accident that happened last week in Birmingham. The victim this time was a poor old woman, who before going to bed turned down the light of her lamp and blew down the chimney to extinguish it. The result was that the flame struck back into the glass reservoir, which exploded, and the woman was terribly burnt. It was ascertained on subsequent examination that the oil had a flash-point of 84° Fahr.; and that the wick was not large enough for its tube; thus leaving a touch-hole through which the flame was blown down into the reservoir. Verdict—"Accidental "death." The official evidence tendered at the inquest, having established these facts, went on to commit itself to the opinion that the flash-point of oil should be raised to 100°; and that there would have been no explosion if the reservoir had been of metal instead of glass. Neither of these expressions of opinion is worth anything. We do not know what the temperature of the reservoir, or of the oil in it, was at the critical moment; and it seems idle to talk of these things in face of what is known concerning the wick. The newspaper statement goes on to explain that non-fitting wicks, in the opinion of the Birmingham lamp makers, are responsible for more lamp accidents than the flash-point of the oil or anything else. In this the trade opinion is more likely to be correct than the official judgment. One of the expert witnesses at the Petroleum Inquiry, after giving statistics of lamp explosions, was fain to confess that, though he had often tried, he had never succeeded in causing a lamp reservoir to explode. Here are the conditions defined—supposing the Birmingham accident to have been a true explosion: Given a lamp that has been burning all the evening, in which, therefore, the reservoir is nearly empty, and hot. The temperature of the air is also that of summer. The wick does not fit the tube, so that air and petroleum vapour already fill the space in the reservoir above the oil. Lastly, blow sharply down the chimney, while the light is turned low. If the curious expert who repeats the experiment begins with oil at 150° flash-point, and, in the event of failure to produce an explosion, goes on with successive reductions of this point until he arrives at success, we shall learn more about the connection between flash-points and lamp explosions than is known at present.

It is curious that Lord Kelvin, who has written to "The Times" upon the report of the Petroleum Committee, takes the Scottish view of the saving quality of a flash-point of 100°. Dismissing the risk of explosion of lamps as insignificant, except in the case of lamps with glass reservoirs, and dwelling upon the commoner case of lamp oil escaping from a broken or overturned lamp and igniting, Lord Kelvin remarks that, "with the 73° Abel "close test or 100° open test, oil escaping from the lamp "at perhaps 100° in the lamp, or a little more or a little "less, falling on a wooden floor near a fire will have many "more chances of taking fire and causing the death of a "poor woman or child if the flash-point is 100° open "test than if it is 20° or 30° higher." Another correspondent declares that the increased safety, under such conditions, of oil at 100° flash-point, as compared with 73° oil, is of no practical importance. Whatever the flash-point of the oil, it is giving off vapour fraught with possibilities of danger after having been in a lighted lamp for an hour. The main point is to ensure that under no conditions shall the oil escape from the lamp. "If lamps are so constructed "that oil cannot flow from the reservoir, it does not matter "a straw what oil is inside it. There can be no fire due "to the oil. If the lamps are not so constructed, then "every outflow of oil may produce a fire, though in some "circumstances one oil may be a little more likely to pro-"duce it than another." It is remarkable how few of the participants in this controversy are able to divide their favours between the lamp and the oil. Most of them try to fix upon one or the other partners of the firm all the responsibility for causing accidents.

The London County Council and the Petroleum Committee.

THE London County Council have not lost any time in framing and uttering an official opinion on the finding of the Petroleum Committee. The *agenda* for to-day's meeting of the Council contains a report of the Public Control

Committee in which reference is made to the circumstance that the Council recommended that the flash-point fixed by the Petroleum Acts should be raised to 105° Fahr. (Abel test), and that the sale and use for illuminating purposes of oil of any lower flash-point should be prohibited. It is recorded that the Petroleum Committee propose to raise the flash-point to 100° (Abel test); and the Council are assured that this proceeding would not increase the price of illuminating oil to the consumer. It is further declared that the proposed alteration would "be the means of preventing nearly the whole of the accidents and deaths from the use of petroleum lamps which are now constantly taking place." The Committee of the Council register their agreement with many of the other recommendations of the Select Committee, and trust that they will in due course become law. But they are above all so deeply impressed with the urgent necessity of raising the flash-point at once, that they advise the Council to address a letter to the Home Secretary, "urging that the Government should introduce and endeavour to pass during the present session a short Bill for raising the flash-point named in the Petroleum Act of 1879 from 73° to 100° Fahr. (Abel close test)." It is a bad thing for the petroleum trade as at present carried on that, in London at any rate, it is not in the hands of costermongers. If this were the case, there is a precedent to clearly indicate that the great and good London County Council would be chary of meddling with it, in the mere interest of public advantage, and risk losing the costermonger vote in a few "Progressive" quarters.

The Lighting of Waterloo Bridge.

The attention of those who are interested in watching the experiments of Municipalism, and also of those who take an interest in practical street lighting, should be directed to the spectacle presented by Wellington Street, Strand, and Waterloo Bridge at the present time. Wellington Street, as strangers to London may like to be informed, is the name of the short thoroughfare which connects Waterloo Bridge with the Strand, having for the greater part of its length on one side the western end of Somerset House, and on the other a quiet row of old office buildings called Lancaster Place. We mention this circumstance for the purpose of showing that the public lighting of the thoroughfare does not receive any assistance from shops. Being also one of the main arteries of Metropolitan traffic, and the bridge being admittedly one of the noblest of London monuments, this line of thoroughfare is a favourite scene for experimental street lighting. At the present time it is an exhibition of good, bad, and indifferent lighting by various methods, and of correspondingly various taste in the lighting arrangements and fixtures. Beginning at the Strand crossing, there will be found at this throbbing junction of street traffic from four directions several lofty "refuge" lamp-posts, bearing bold octagonal lanterns containing clustered flat-flame gas-burners. These are unexceptionable—or they would be if the Strand Board of Works, who are the local Highway Authority, would only keep up the columns a little more nattily. As an example of street lighting of the first order, however, these lights leave nothing to be desired. They give a flood of light upon the roadway where it is most needed, without attracting the eye to themselves; and if they should happen to catch the eye of a pedestrian or a coachman, they do not dazzle. Farther on, going towards the bridge, the ordinary street-lamps placed on the line of the kerb were till last week occupied by Denayrouze high-power incandescent burners, the brilliancy of which was as noticeable as the crudity or hardness of the effect produced by the unshaded mantles.* Alongside these, the retired pavement of Lancaster Place is provided with a few ordinary square street-lamps, with 5 cubic feet flat-flame burners. Across the way, the carriage entrances to the Somerset House front are flanked by globular lanterns which do not appear to have been cleaned since they were put up. Then we come to the bridge itself—that grand monument of which even the London County Council are supposed to be very proud. The lighting of the bridge is in the hands of the Council. The old lamp-standards, which date from the building of the bridge itself, are of a simple, dignified, and peculiar design. They start from a plain, oblong base, with four square bars tapering to a smaller cap; the bars being joined top and bottom by diagonals meeting in a rose at the crossing. Hitherto these standards have carried square lanterns, with a pair of flat-flame gas-burners in each, and finished off with a Royal Crown finial of the pattern familiar to the present generation on florins, and on the publications of the Science and Art Department. Now, every alternate standard has been removed, and replaced with a skimpy cast-iron post for an electric arc lantern of the elongated hexagonal pattern introduced by the City of London Electric Light Company—the Royal Crown being rejected for a round knob—with the crinkled glass which soon gets so dirty and cannot be effectively cleaned. In other words, the electric lamps are "staggered" along the bridge with the gas-lamps, but at a different height. What a display of Progressive taste! Of course, the old parapet has had to be hacked about to accommodate the new lamp-posts; but it could stand more than that. Possibly the beauty of the site and its matchless surroundings will triumph over the vandalism of the London County Council; but the case is a melancholy one all the same.

* These are now replaced by triple flat-flame burners.

The Gas Supply of Vienna.

At the last general meeting of the Imperial Continental Gas Association, the Chairman, Mr. T. H. Goodwin Newton, briefly mentioned the litigation which was then pending between the Association and the Municipality of Vienna on the question of the duration of the concessions for the lighting of the out-townships. As will be seen by a report which appears in another column, the Association have now obtained judgment in their favour for the second time in the High Court of Justice; the confidence expressed in this regard by the Chairman being thus justified by the event. There now only remains the Court of Appeal. The rest of the statement to which we give currency goes to describe the wretched condition brought about in the Austrian capital by the arbitrary conduct of Dr. Lueger. Never was there a more pitiful example of the operation proverbially known as "cutting off one's nose to spite one's face." The Vienna Municipality will have to pay 36 million florins for their new gas-works outside the city, whereas the existing works could have been had for 16½ million florins. Moreover, when finished these new works can only be used to supply the "inner circle" of the city; and in order to get at this region the trunk mains must cross a suburban belt in which the Association have the exclusive right of putting down pipes. The central streets have been torn up in all directions for laying the municipal mains, and not made good again because the distributing plant of the Association is to come up next year, when the Association must restore the pavement. In these depressing circumstances, it is not to be wondered at that the easy-going, pleasure-loving Viennese find life in the city hardly worth living, while the local taxation must be heavier than ever. It is evident the advantages of Municipalism are subject to local realization. A strong national Government might have checked Dr. Lueger's vagaries before they went the length of spoiling the streets of the capital and jeopardizing its finances; but the Austrian Imperial Administration has enough to do just now without troubling much about Dr. Lueger's gas-pipes, even if it does not find in this crying Viennese nuisance a counter-irritant of political value.

A Point of Parliamentary Procedure.

An important point of parliamentary procedure falls to be noticed this week. On the order for the second reading of the General Power Distributing Company Bill, which came up in the House of Commons last Friday, the Chairman of Ways and Means (Mr. James W. Lowther) submitted a resolution empowering the promoters to "hang up" the measure until next session—the progress already made being allowed to count when the consideration of the Bill is resumed in 1899. A similar course was adopted in July, 1871, in regard to certain London Tramway Bills. In the present case, it was explained to the House that the Bill deals with a very large area and with new principles. Its progress has been delayed by the action of Parliament itself, not through any fault of the promoters. It has, in fact, been kept back for the presentation of the report of the Joint Committee of the Lords and Commons upon Electrical Energy Generating Stations; and it could not be properly dealt with this session. There is considerable opposition to the Bill on the part of Local Authorities; but, to their credit, the opponents have not objected to the fair and reasonable course proposed by the Chairman of Committees, which will ensure the Bill being considered on its merits. Care was taken to make it clear that this

exceptional treatment is only extended to this particular Bill on account of the special circumstances; but it is very much to the point to inquire, as the "Daily News" does, whether this is "the thin end of a wedge that will by-"and-bye be driven into one of the toughest old parlia-"mentary blocks." What is fair in one instance can scarcely be argued to be unfair in another, and the ready welcome extended by the House to Mr. Lowther's proposal of Friday is certain to be invoked for other causes. An enormous amount of parliamentary time and labour is annually thrown away, and grievances stand unredressed year after year, because of the rule that business left unfinished at the end of the session must be begun *de novo* if reintroduced in the next. The "Daily News" remarks upon this: "The common sense of the nation will drive "in this wedge, and we shall hear of a great extension of "the principle of carrying over measures from one session "to another." It is admittedly not always a loss or disadvantage, even to the cause of reform, for Bills to have to be discussed afresh, and even re-drafted, session after session. There comes a stage, however, in the history of most projects of legislation that are worth anything, when both promoters and opponents would like to dispense with this traditional brake upon legislative progress.

No Peace for South Wales.

Sir Edward Fry is reported to have definitely accepted the conclusion that his mission of conciliation to South Wales has failed. This is the view we ventured to take a week ago; but it is nevertheless possible to hold the somewhat paradoxical opinion that Sir Edward's failure was, in a sense, a success. It succeeded as a demonstration that the difficulty in the way of the resumption of friendly relations between masters and men lies wholly with the latter. It was to the men that Sir E. Fry went first; and he was in consultation with them throughout—the employers having taken an early opportunity of notifying to him that they had no need for his good offices. Apparently Sir Edward had something to do with the framing of the so-called new proposals submitted by the men's representatives to the Employers' Committee at the joint conference which followed his visit to Cardiff. It seems that these proposals pretended to accept the sliding-scale principle; but there was added a demand for "some "protection that wages should not be unfairly reduced as "a result of undue competition, and that some method of "securing finality in the decisions of the Joint Com-"mittee should be adopted." This was only a roundabout way of bringing in the independent umpire, as desired by the men all along, and as emphatically rejected by the employers. As the men would not drop this old demand, and the associated employers decline to entertain the idea, the deadlock continues. It is hardly disguised any longer that Mr. B. Pickard, the President of the Miners' Federation, is "engineering" the strike, with the ulterior object of getting Trade Unionism established in the South Wales coalfield. Naturally, Mr. Pickard hates the sliding-scale, and wishes to stop the Welshmen from accepting the principle again. According to a newspaper report, he has been bold enough to state publicly that "during the time "the sliding-scale has been in operation in South Wales, "there have been more strikes in South Wales than under "the Federation."

The Liberty and Property Defence League and Monopolists.—In a pamphlet bearing the title of "Fairplay *versus* Monopoly," the above-named League set forth the reasons why, in their view, the General Power Distributing Company, whose Bill has been passed by a Committee of the House of Lords (see *ante*, p. 53), and is now before the Lower House, ought to be allowed to supply the public with cheap electrical energy. It is pointed out that the efforts at the municipal supply of electricity in certain boroughs within the area dealt with by the Bill have not been at all successful, and that users of electrical energy are charged from 5d. to 7d., as against 4d. per unit, the maximum which the Company would be able to charge. The League conclude their exposition of the case by showing that it is the municipalities who are the advocates of "monopoly" and "vested interests," inasmuch as they claim to be protected against competition merely because they happen to be in possession. Some strictures are offered on what is termed the "vicious system of indirect or oblique taxation," by which one class of the ratepayers—say gas consumers—have to support a costly educational establishment; and it is remarked that such a course "is as unfair a method of local taxation as if butchers' customers, and they alone, were taxed, at the instigation of a vegetarian majority, to maintain the local police force."

WATER AND SANITARY AFFAIRS.

The evidence given by Mr. F. G. Banbury, M.P., before the Metropolitan Water Supply Commission last week brought a new feature into the proceedings, in the shape of a plan devised by that gentleman for the purchase of the existing undertakings. The essence of the scheme was described as purchase by dividend, instead of purchase by capital value. That is to say, the shareholders were to be secured in the possession of their present income; and, although allowed nothing for compulsory purchase or for prospective profits, they would benefit by the increased security of their income, and by the augmentation of capital value due to the circumstance that they would hold stock possessing peculiar advantages. Any increase in the profits of the water undertakings would go to the benefit of the consumer, who would in all probability escape anything in the nature of an extra charge for the supply. The plan was simply that of a small statutory central body, to be created by Parliament, with authority to issue a 3 per cent. perpetual stock, secured on the rates. Each shareholder or debenture holder would receive sufficient of this new stock to yield him the same return he was previously receiving. By means of this stock, the statutory body would purchase the undertakings of the Water Companies, and the disturbance of the Money Market which would thereby be occasioned, by the cash payment of some 30 or 40 millions sterling, would be avoided. The stock would be transferable at the Bank of England, and trustees would be entitled to invest in it. Of course, the Progressives of the London County Council will offer the most determined opposition to any such scheme as this. It is too equitable. Nobody would be taxed by it, and nobody would be robbed. To give to the water shareholder what he now receives is the very last thing to which a typical Progressive will consent. The shareholder is to lose some part of his present income, and the County Council is to step into the full possession of it. But the power must come from Parliament; and the Legislature is not likely to see things of this kind with the same eyes as the County Council. The voice of the Royal Commission also has to be heard; and public opinion has to be consulted.

Mr. Banbury's idea is that the statutory body to carry out his scheme, and to manage the water supply, should be appointed by the Government. He says the City has not much faith in the business capacity of the County Council. His own opinion was that if the Council were substituted for the statutory body, his scheme would work well for the shareholders; but he doubted whether it would for the ratepayers. We are perfectly certain that the shareholders would prefer for the County Council to have nothing to do with the working out of the project, as there would be all the risk that the Council would play some prank calculated to lessen the capital value of the stock. The consumer and the ratepayer would also have reason to deprecate the interference of the Council. When once in possession of the Metropolitan Water Supply, the authorities at Spring Gardens would make it subordinate to their own plans, and would be in no way likely to do justice to the present means. The Welsh scheme will still be the favourite child, though Mr. R. E. Middleton, with excellent experience and professional qualifications to guide him, is able to show the Royal Commission the extravagant cost of bringing a supply from Wales, as compared with the Staines reservoirs scheme.

Yesterday the Royal Commission sat for the thirty-first time. The "Daily Chronicle" is losing all patience over this matter, and accuses the Commission of executing a policy of delay, which has the double disadvantage that it "suits the Water Companies and disappoints the "County Council." But why should the County Council be thus "disappointed"? It has so far enjoyed a good long talk with the Commission; and if only it wished to hasten matters to a conclusion it might have sent fewer witnesses or given them less to say. Of course, the "Chronicle" and the Progressive party may be specially anxious just now to see the inquiry brought to a close. The case for the Companies is coming on, and the Progressives can have no desire to hear it, or to let anybody else do so. Fallacies and misrepresentations calculated to damage the Companies are in danger of being demolished; and after all the talk on one side, silence would be golden on the other. We are told that the

Royal Commission is "dawdling" over its work, and "its "evident intention is to spread itself over another session." Of course, the "Chronicle" can settle the whole question in five minutes, though it has taken a Select Committee four years to report on the flash-point of petroleum. It is complained that the Commissioners only meet "for a few "hours on Mondays now and then." We see some reason to believe that the Commissioners would be very glad to meet oftener, if an arrangement could be made for the purpose. They recently attempted to sit twice a week, but by some means were foiled—possibly by the difficulty of obtaining the presence of Counsel. Has Spring Gardens any complicity in this? But if the Commission cannot get on faster, there is something else in store. "It may be "necessary," we are told, "for the County Council to take "independent action, and promote legislation next session." The responsibility for delay is to be placed on the Government. But in the meantime the County Council goes into recess for two months.

Hamor Lockwood's, Limited.—In another part of the "JOURNAL" will be found the prospectus of a Company formed to acquire the business of a tar distiller, manufacturing chemist, &c., established 35 years ago, and now carried on at Bradford and in Manchester, by Mr. Hamor Lockwood. The capital is £100,000, divided into 30,000 cumulative preference (5 per cent.) shares and 70,000 ordinary shares of £1 each. The present issue consists of the whole of the preference shares and 50,000 of the ordinary shares; the remaining 20,000 of the latter being reserved for future issue when required for the development of the business. The subscription list opened yesterday, and will close to-morrow afternoon.

Hydraulicity of Cement.—The hydraulicity of a cement can be determined with certainty by the following test, according to Mr. Uriah Cummings, of Stamford (Conn.), who states in a recent work on American cements that for thirty years he has never known it to fail to expose defective material. A cavity 1·5 inches wide, 1 inch deep, and 8 inches long, with slightly bevelled ends and sides, is cut in a piece of hard wood. It is well oiled, and then filled with a stiff paste of the material to be tested, pressed in firmly with a trowel, and smoothed off even with the face of the mould. After the cement has hardened, which takes from twenty minutes to two hours, the mould is turned bottom up on supports ½ inch thick under each end. By careful jarring, the bar of cement will drop out. It should then be placed on its side on two supports, at least 6 inches apart and 1 or 2 inches high, in a pan or box, which is afterward filled with water. If the cement is strong in hydraulicity, the bar will maintain its shape indefinitely.

Sulphate of Ammonia and Nitrate of Soda in Germany.—According to the report for the year 1897 of the German Association for the sale of sulphate of ammonia, the production of this material in Europe is estimated at 375,000 tons, as compared with 330,000 tons in 1896. The total is divided as follows: England, 215,000 tons; Germany, 100,000 tons; France, 30,000 tons; Holland and Belgium, 30,000 tons. Of the 100,000 tons assigned to Germany, 46,000 tons came from the coke-ovens of Westphalia, 40,000 tons from those of Silesia and Austria, and 14,000 tons from gas-works. The imports of sulphate last year reached 33,113 tons (24,023 tons from England), as compared with 32,061 tons (22,344 tons from England) in 1896. The imports of nitrate of soda were 465,493 tons, against 449,027 tons in 1896. The exports of sulphate and nitrate were 2623 tons and 11,363 tons respectively. The price of sulphate when the year opened was about 19·50 frs. per 100 kilos. It rose to 20 frs. in February; dropped to 18·20 frs. in March; and closed at 22·50 frs. in December. Nitrate began at 19·25 frs.; dropped to 16·75 frs. in July; and closed at 17·60 frs.

The Gas Companies' Protection Association.—Mr. F. E. Cooper, the Secretary (*pro tem.*) of this Association, has issued, in accordance with instructions received from the Provisional Committee, a circular announcing the formation of the Association, with Mr. Henry Kimber, M.P., as President; its object being to protect "the property, revenues, rights, powers, and privileges of gas companies," secure united action, and generally keep the members informed of all parliamentary or other proceedings affecting their interests. The names of the Committee, which is a very representative one, are given; and a desire is expressed that the utility of the Association may be rendered as great as possible by all the gas companies throughout the kingdom becoming members. The annual subscriptions range from £2 2s. for companies whose capital does not exceed £50,000 to £10 10s. for £1,000,000, above which figure the payment is to be optional, but not less than £10 10s. For the present the issue of the circular has been confined to companies having capitals of £40,000 and upwards. While these companies will profit by joining the Association, it seems to us that the assistance which the new organization will render must be specially valuable in the case of the smaller companies, who much more frequently stand in need of advice on matters of detail than the larger ones.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 215.)

BUSINESS continues to fall away in the Stock Exchange; and as the end of July approaches, the markets are rapidly settling down into the usual autumnal condition of inactivity. The tendency last week was rather flat at first, through sheer lack of support; but before the close, things took a rather better turn. Some agreeably surprising railway dividend announcements, and a renewed hope that peace in the western hemisphere was almost within sight, put a better complexion on affairs. Movements in price were irregular—some of the gilt-edged, which were standing rather too high, coming down; while improvements took place in the more speculative lines. The Money Market is quite unchanged; and there seems to be a strong prospect of marked ease lasting yet for some time to come. Business in Gas during the week was of the most slender proportions; and on some days it approached complete stagnation. It was utterly devoid of feature, too. Movements in price were very few in number, and slight in extent; and they were almost wholly confined to issues of only secondary importance. Gaslights were quite unaffected. The "A" was very moderately dealt in—the price being steady at about 298 or 299, but not inclined to go higher. A few transactions also took place in the secured issues at good average figures. South Metropolitan was fairly brisk when compared with the rest. The price was well abreast of quotation, but was not disposed to advance. Commercials were quiet and unchanged. The Suburban and Provincial group was as quiet as the rest, though some transactions took place in issues which are not often in the market. The general tendency was favourable; and Brentford new improved a little. The Continental Companies contributed but little to the aggregate of business; but a further recovery took place in Continental Union. Among the minor undertakings, Hong Kong recovered the half point it had lost, and Bombay had a rise; but Tuscan receded. Transactions in Water Stocks were a little more numerous than in the preceding week; and the tendency was firm. Changes in quotation were few and slight; but they were in the upward direction.

The daily operations were: Business in Gas was quiet on the opening day, but not below the average of the week. Prices were not changed. The same may be said of Tuesday; the position remaining unaltered. Transactions on Wednesday were still more restricted; but Hong Kong advanced ½, and Bombay ¼. On Thursday, everything was quieter. Brentford new rose 2½; and Continental Union preference, 3. In Water, East London and Lambeth 7½ per cent. gained 2 each. Friday would have been as dull, but for some dealing in South Metropolitan, which relieved the blank. Quotations did not move. Saturday was no quieter than any other day; and prices generally were fair. Tuscan fell ½.

ELECTRIC LIGHTING MEMORANDA.

The Decision of the Committee of the House of Commons on the Marylebone and Bermondsey Orders—The Question of Expediency—Mr. Littler's Triumph—Inconsistency of the Committee.

GREAT was the rejoicing among the statutory electricity supply companies when the House of Commons Committee threw out the much-discussed Provisional Order granted by the Board of Trade to the Marylebone Vestry, and suggested that the companion Bermondsey Order should be withdrawn with a view to the Vestry considering the question of buying out the local Company. The shares of the Metropolitan Company, who serve Marylebone, jumped up £2, and those of all the other Companies exhibited a sympathetic improvement. It will be desirable to trace the history of this momentous decision in some detail. The question of principle left for the Committee to settle has been discussed in these columns for several weeks past. It was explained in Parliament that, in granting Provisional Orders for electric lighting to the Vestries of Marylebone and Bermondsey, the Board of Trade had acted as they considered in the spirit and according to the letter of the Electric Lighting Act, which expressly countenanced competition in this business, and with the intention of taking the opinion of Parliament upon the particular aspect assumed by the proposed competition in these two cases. The Department did not feel justified in withholding the Orders, against the terms of the Act, merely because they proposed that the Local Authorities should compete, by the aid of public money, with Companies already established in the same districts.

Of course, the legality of the Orders could not be disputed. They would have brought into the specified areas just the competition in electricity supply which the Act provided for. But behind the strict letter of the law stood the question of expediency, not to say of justice. Granted that competition between two different sources of electricity supply is not only legal, but is in a general way advantageous to all parties concerned—to the competing undertakings not less than to the public—it remains to show that such proceedings as those proposed by the

Marylebone and Bermondsey Vestries are for the public interest, in the circumstances. The Commons Committee have said "No" in one case, and "Yes" in the other. The Marylebone Vestry are told that they cannot be permitted to start electric lighting in competition with the Company actually doing business in the locality. If they wish to obtain this business for themselves before the statutory 42 years, they must buy out the Company, as other local authorities have done. On the other hand, the case of Bermondsey is different. Here there is no electric lighting, though there is an Electric Lighting Company and some distributing plant. The Vestry are anxious to go in for dust destruction and public street lighting, which the Company are by no means desirous of touching. The Company happens to be the London Electric Supply Corporation, who are not disposed to be antagonistic to the Vestry. At the same time, no company can relinquish statutory rights save for some consideration acceptable to the proprietors. The Committee thought at first that the Bermondsey Order should be withdrawn, as the point raised in it is not, in their opinion, ripe for discussion. They also thought that the Vestry should consider the question in the light of purchase.

This looked very much like the rejection of the Order; but Mr. Littler, for the Vestry, hung on to it for the purpose, as he said, of saving a year in getting on with the dust destruction and street lighting. The Committee yielded so far as to give another sitting for the purpose of hearing Mr. Littler on his new point. Accordingly, he brought up a clause which the Vestry were willing to insert for the protection of the London Electric Supply Corporation, agreeing not to supply electricity under the Order until the existing distributing mains of the Company, as they were on the 15th inst., had been purchased. Thereupon the powers of the Company to supply electricity within the district were to cease and determine. In reply to this suggestion, the representatives of the Company urged that they could not get their Directors and shareholders together to consider the offer. It was also pointed out that the new clause not only meant compulsory purchase of the distributing plant, but also that the power of supply should go with it. Hereupon the Chairman of the Committee seemed to imply, by a question, that he thought the Directors had full power to deal with the point. After some further protests by Counsel on both sides, the Committee deliberated. When the public were re-admitted, the Chairman said the Committee had hoped that some satisfactory arrangement could have been arrived at. "As this seemed impossible, they had only one duty to do, and that was to decide that the Order, so far as it related to the Bermondsey Vestry, should be confirmed."

This decision, so report says, "was received with evident surprise by the parties." And well it might be. After what the Committee had stated at the previous sitting—that the Order was premature, and that the Vestry should reconsider their proposals in the light of the obligation to purchase the distributing part of the local undertaking of the existing Company—the ultimate decision looks very much like a display of impatience because the representatives of the Company did not feel justified in accepting off-hand the compulsory clause sprung upon them at the last moment. The Company will now, of course, continue their opposition to the Order in the House of Lords; and it will be a strange thing if this House does not deal with the matter in the spirit of the earlier judgment of the Commons Committee. It would perhaps be harsh to remark that this Committee stultified themselves by their action; yet it is difficult to classify their performance otherwise. Mr. Littler, not for the first time in his career, did a smart stroke of business for his clients in making the Committee turn back from their deliberate opinion; but we are by no means sure he was not a little too smart on this occasion. Perhaps if the proposed purchase clause had contained mention of terms of compensation for the extinguished right of supply, as well as for the structural part of the property of the Company, an agreement might have been come to, and further parliamentary opposition saved.

GRANT OF A COMPULSORY LICENCE TO WORK A BRITISH PATENT.

An important event in the history of the British patent system, and also of the international coal-tar colour industry, occurred during the past fortnight. The Board of Trade on the 6th inst. issued the first order for a compulsory licence to a British manufacturer, under section 22 of the Patents, Designs, and Trade Marks Act, 1883; the petitioners being Messrs. Levinstein, Limited, and Ivan Levinstein, of Manchester, and the patentees the Farbwerke vormals Meister, Lucius, and Bruning, of Hoechst-am-Main, in the German Empire.

The circumstances of the case may be within the recollection of our readers. Some time ago, the Chemical Sub-Committee of the Manchester Chamber of Commerce and others began agitating for an amendment of the British patent law in the direction of adopting the principle found in the patent laws of some countries by which patented inventions must be compulsorily worked in the country by the patentees, or else the patent becomes invalid. The history and actual condition of the coal-tar colour industry, which originated in England through the genius and labours of Dr. Perkin, and subsequently migrated to Germany, was from the first employed to illustrate the suggested need for such an alteration of the law. As a matter of truth and justice, the illustration was not quite fair to the Germans. The direct fruit of Dr. Perkin's discoveries was protected in England by a "master patent" under which the proprietors amassed much money, while no other British firm were able to embark in the trade. The original patentees, it has been alleged, did not concern themselves with the development of the industry of whose beginnings they were the sole proprietors; and consequently when the master patent expired, and they went out of the business, there was nothing much for their successors to go on with. Meanwhile, however, a master patent had been refused in Germany, which gave German chemists the opportunity to carry on and develop the industry with all the resources at their command. Consequently, patent after patent for developments of the industry were taken out by the Germans, until by the time the original germ of the trade came into the hands of English manufacturers to deal with as they chose, all the newer and best-paying derivatives were German property. The British consumer had nothing to complain of—or, if he had, he did not know it. The German colour manufacturers sent over here all the coal-tar dyestuffs and drugs necessary to supply the English market, and sold them for what they would fetch—meanwhile, of course, keeping the production in their own hands at home.

This was the situation when Sir Bernhard Samuelson became the spokesman of a party who clamoured in and out of Parliament for the introduction into the English patent system of the principle of "compulsory working" within the realm. A good deal concerning this agitation will be found scattered through the last three volumes of the "Journal." There was much speciousness about the demand for a "compulsory working" clause after the Continental model, which carried away many superficial thinkers. Experts in patent matters knew all about these foreign provisions for the compulsory working of patents in the country granting the patent, and very few of them admired the principle. Amateurs of British patent law reform upon the Continental plan did not ask themselves how English traders and consumers would benefit by the establishment in this country of a branch factory of some German house, where, for the sake of satisfying the letter of the law, a certain quantity of a patented speciality would be manufactured, still by foreign hands, working with foreign capital, and not competing in any real way with the bulk of the import trade.

Questions were asked upon the subject in Parliament; and the official reply referred to section 22 of the Patents, Designs, and Trade Marks Act, 1883, which had so far not been put into force because nobody had ever asked for it. The Manchester Chamber of Commerce sent a deputation to the Board of Trade in April of last year which further cleared the air. Sir Courtenay Boyle deprecated the too-ready presumption of the Manchester manufacturers composing the deputation, that the English law under which a patentee might be ordered to grant a licence to "any person interested" was a dead letter. He offered them the practical suggestion that the question might be tried upon a test case; and, to their credit be it recorded, the agitators took the Secretary of the Board of Trade at his word. A test case was prepared by Messrs. Levinstein, supported by the Manchester Chamber of Commerce, with the result already stated. The precedent thus created is of supreme importance. Those who declared that the new provision introduced into the patent law of England by section 22 of the Patent Act of 1883 is of far greater value than the "compulsory working" provisions of foreign patent systems are fully justified; and it is to be hoped that the ignorant clamour for the latter will now be stilled. If the Manchester men were misled, as they undoubtedly were, into finding fault somewhat intemperately with the English law before putting it to the proof, they will perceive now that the power to compel a patentee to grant an English licence to another person in the trade is of infinitely greater value than the much-belauded obligation to work his patent himself in this country.

Considering for a moment the general question of compulsory working, we may refer to the denunciation of the principle by Mr. A. V. Newton, cited in the "Journal" for Sept. 28 last. He declared that the question of the policy of compulsory working was threshed out before the Institute of Patent Agents in 1887, and decided in the negative. The question cropped up again at this year's Congress of the International Association for the Protection of Industrial Property (see "Times" report, June 4), when a resolution moved by a French delegate in favour of the modification of the article of the Paris Convention relating to compulsory working was agreed to after several delegates had described as intolerable the present state of things in countries where the principle is in force.

Reverting to the precedent of the Levinstein compulsory licence, which is a complete vindication of the Act of 1883 and of the Board of Trade from the charge of supineness, it is to be borne in mind that the putting in action of section 22 is no small or easy performance. Mr. Roger W. Wallace, Q.C., who has had the fortune of being called in by the Department to help decide one or two of these cases, fully admits, in his useful "Handbook of the Patent Law," that a system of compulsory licences must "prove of great public benefit if patentees are enabled by its instrumentality to combine the inventions of others with their own, and thus produce more efficient machines

and products of better quality." Also, the same authority remarks that "foreign inventors who take out patents in this country without any intention of working here, but merely to prevent any competion in this country, will find it difficult to do so in future if this section is properly carried out." Happily, the wording of the section has not been found to fall short of the requirements of the test case. The section* is as follows: If on the petition | of any person interested | it is proved to the Board of Trade | that by reason of the default of a patentee to grant licences on reasonable terms | the patent is not being worked in the United Kingdom; or | that the reasonable requirements of the public with respect to the invention cannot be supplied; or | any person is prevented from working or using to the best advantage an invention of which he is possessed | the Board may order the patentee to grant licences on such terms as to the amount of royalties, security for payment, or otherwise, as the Board, having regard to the nature of the invention and the circumstances of the case may deem just; and any such order may be enforced by *mandamus*.

Accordingly, Messrs. Levinstein submitted to the Board of Trade that certain patents, relating to the production of articles in which they were interested, were actually assigned to Messrs. Meister, Lucius, and Bruning. The petitioners proved that, by reason of the default of these patentees to grant licences on reasonable terms, the said patents were not being worked in the United Kingdom; and further that, by reason of such default, the petitioners were prevented from working and using to the best advantage certain inventions of which they were possessed. All the heads of the necessary proof being thus made out according to the language of the section, the Board of Trade have directed "that a licence to take effect from the date of this order and in the form set forth in the schedule hereto, be forthwith granted by the patentees to the petitioners to make, use, exercise, and vend, within the United Kingdom, the inventions described . . . for the unexpired residues of the respective terms of the said letters patent, at a royalty of one halfpenny for each pound weight avoirdupois of products made by the licensees under the said letters patent or either of them, but so that in each year a minimum royalty of £250 per annum shall be paid by the licensees, and the patentees shall forthwith deposit such licence, duly executed by them, with the Board of Trade." Within a month a counterpart licence is to be deposited by the petitioners, on pain of the order being made of no effect.

This decision settles the question of whether or not section 22 of the Act of 1883 is a dead letter. The case was fought before the Board of Trade at a cost to the petitioners, it is reported, of £2000. There is no order as to costs; and no appeal from the decision of the Department. The costliness of the proceedings is no affair of the Board of Trade; the fee payable on application for a compulsory licence being only £5. It is the struggle for the business that costs; and the fact is likely to act as a very salutary check upon frivolous or vexatious petitions. Messrs. Levinstein are to be congratulated on having been able to get a sound case to fight upon; and it is to be hoped they will find the rest of the game "worth the candle." It must be conceded that the precedent set in this instance deals a deadly blow at the selfishly monopolistic use hitherto occasionally made of patents, and not by foreigners only. The promptness with which the Board of Trade acted in the matter, when once set in motion, is not the least satisfactory part of the transaction.

THE ACETYLENE EXHIBITS AT THE IMPERIAL INSTITUTE.

(*Continued from p.* 146.)

The criticisms we have so far offered of the acetylene exhibits at the Imperial Institute have been couched in general terms, and have not applied specially to the productions of particular manufacturers. In order to give point to what has already been said, and also to indicate more precisely the distinctive features of noteworthy apparatus, it is now desirable to enter into a more detailed review of some of the generators exhibited. The examples are chosen solely for the object we have specified; and we do not wish to imply that they are either more or less meritorious than others we have been forced to overlook.

Not a few experts have expressed the opinion that automatic generating apparatus is a delusion and a snare; and these gentlemen will approve the generator which is manufactured by the Ideal Gas Company, Limited, of Blackburn. This plant has been briefly described in our "Register of Patents" [Vol. LXIX., p. 890; and Vol. LXXI., p. 1067], under patents No. 15,654 of 1896 and No. 13,667 of 1897. Messrs. Whalley and Hacking, the inventors, have thought simplicity of construction compatible with efficiency of working. They take a bell gasholder of ample capacity, and collect in it the acetylene generated from a charge of carbide which will not suffice to furnish such a volume of gas as would fill the holder. The water is run from a cistern directly on to the carbide, which is contained in a generating chamber from which the gas passes through a cooling and condensing chamber to the gasholder. Make all your gas and then—but not till then—proceed to use it, appears to be the motto of the inventors, who are sceptical as to the merits of the hand-to-mouth system of lighting which the so-called "automatic" acetylene generators exemplify. If we accept the testimony of competent experts who have closely examined the apparatus when in action, we are forced to the conclusion that this simple plant works admirably. A mere cursory examination of the generator in use at the exhibition confirms this conclusion. We are not quite satisfied that there really is no risk of a dangerous or troublesome rise of temperature in the generator, and think it possible that irreparable mischief may thereby have been done to the gas before it enters the cooling chamber. Provision for the purification of the gas previous to its entering the holder should be made. The plant works at low pressures, and is one of the simplest exhibited. The compilers of the price-list of the Ideal Company seem to have been anxious to enrich our language with the word "Ometer," which is neither useful nor elegant. Had they a suspicion that the physical condition of the acetylene produced in their apparatus did not justify the use of the word "gasometer," which was evidently in their minds?

The Manchester Acetylene Gas and Carbide Company, Limited, have made generators which have been extensively used on the Manchester Ship Canal and elsewhere. The generators are manufactured under the patents granted to Mr. A. Kay; and a clear impression of the principles on which they work may be gathered from the abstracts of the specifications and illustrations given in our "Register of Patents" [Vol. LXIX., pp. 484, 848]. The generator is a simple and convenient form of the drip type, in conjunction with a bell gasholder, by the rise and fall of which the rate of generation is controlled. The general objections to generators of the drip type must undoubtedly apply to this apparatus; but the fact that it has shown itself capable of working satisfactorily under by no means ideal conditions, certainly indicates that some of these objections are rather fanciful than real. The illustrated list issued by the Company is conceived in a very bombastic spirit; and the remarks we have made as to the "exaggerated claims" put forward by certain generator makers on behalf of acetylene, apply forcibly to many of the statements made in this list. We are convinced that harm will ultimately accrue to the whole acetylene industry from the misguided efforts of interested parties, who would have us believe that acetylene is the ideal and cheapest illuminating agent under all conditions.

Sardi's Patent Gas Generator Syndicate, Limited, make a dip generator of the automatic class, which is a modification of that described and illustrated in our "Register of Patents" [Vol. LXVIII., p. 1237]. The patent referred to was granted to Signor Sardi, of Turin; and we understand the apparatus has been used to a considerable extent in Italy. The carbide basket which passes through the crown of the generator-bell in the original Sardi apparatus, has been superseded by a series of trays, placed vertically above one another. This change should considerably reduce the after-development of gas which is so marked a phenomenon with most patterns of dip generators. At the Imperial Institute, a so-called 40-light generator is used for the supply of a 7-light pendant. The Sardi apparatus is a very good example of the dip class of generator; and many of the common objections to the class do not apply to it. The list issued by the Syndicate has all the faults of which we have complained in other instances.

Messrs. Thorn and Hoddle exhibit generators and accessories. The generators are of more than one pattern, and that described in our "Register of Patents" [Vol. LXVIII., p. 319], has apparently been superseded by later modifications. This firm supply some useful accessories, such as an air-tight carbide receptacle for storage purposes. They also offer a special purifying material (at 6d. per lb.), for use in a special purifier. By the use of this material and apparatus, the "acetylene light" is said to be rendered "absolutely smokeless and odourless while burning;" and its brilliancy and colour are stated to be improved. In an article on "The Purification of Acetylene" in the "Journal" for June 14 last (p. 1375), we showed that such claims on behalf of any purifying material were absurd; and our warnings apparently came none too soon, for there are now being offered to the public many special purifying agents to which impossible qualities are ascribed.

(*To be continued.*)

Automatic Lighting of Public Lamps.—M. Rodenbach, a Swiss gas engineer, has devised for the automatic lighting of public lamps an appliance having the appearance of an alarm-clock. The face is divided into 24 hours, and carries three hands—one indicating the hours, and the others being used for marking the times of lighting and extinguishing. A smaller dial, divided into minutes, serves to regulate the movement of the hour hand. All the lanterns fitted with this appliance are lighted and extinguished automatically at the time determined upon—one hand opening a tap and causing the gas to ignite at a pilot-light, and the other closing the tap. These operations go on regularly so long as the clock is wound up, which has to be done once a month; and the hands have, of course, to be set according to the season. The inventor claims that the initial outlay for the clocks and their application to the public lamps will be recouped in a year or so by the reduction of lamp lighting expenses.

* For the sake of clearness, we have here divided up the section into the different heads of the case that must be made out to the satisfaction of the Board of Trade.

OBITUARY.

The secretaryship of the Drogheda Water-Works Company, Limited, has become vacant by the death of Mr. PATRICK REDDY, who held the position, in conjunction with the managership, for about twenty years.

The death is announced as having taken place on the 18th inst., at Blackpool, of Mr. GEORGE NEWTON, who in 1862 founded the Prince of Wales Meter-Works at Oldham, which since 1876 have been carried on by his son, Mr. Robert Newton.

By the death of Mr. G. ARMSTRONG, of Newcastle, which took place last Friday night, after a comparatively short illness, in his 73rd year, the Newcastle and Gateshead Gas Company lose a Director, and the Water Company their Solicitor.

PERSONAL.

Mr. George Livesey and Mr. George Bray.

It is with the greatest possible pleasure that we are enabled to inform readers of the "JOURNAL" that the long-standing disagreement between Mr. Livesey and Mr. Bray (into the originating cause of which it is unnecessary to enter) has been honourably and happily terminated. We have been permitted to peruse letters that have, within the past few weeks, passed between these gentlemen, which make it abundantly clear that they are both glad to let bygones be bygones, and that they will henceforward, as one of them puts it, "recognize each other as friends." This notification of a reconciliation which, we are assured, will leave no trace of rancour behind, but rather a heightened mutual respect, has been submitted to both parties, and is published with their complete concurrence.

Mr. W. H. FORD, of Saltash, has been appointed Manager of the Ashburton Gas-Works.

Mr. J. C. SWINBOURNE, the Manager of the Llanidloes Gas-Works, has been appointed Secretary, in succession to the late Mr. J. D. Davies.

Mr. G. CLOSE, the Manager of the Kingscliffe Gas-Works, has resigned; and Mr. W. CLIFTON, a former Manager, has been appointed his successor.

The Hon. E. H. JOHNSTONE has been elected a Director of the West Middlesex Water Company in place of the late Baron Dimsdale, whose death was alluded to by the Chairman (Mr. E. Boulnois, M.P.) at the last half-yearly meeting.

Mr. G. W. YOUNG, Manager of the Carlow Gas-Works, has obtained a similar appointment at Kilkenny, in succession to the late Mr. W. H. Catlin. Mr. Young, who was formerly at Cleator Moor, was selected by Mr. G. Anderson out of about a hundred applicants.

Mr. H. E. SMITH, who, as announced in the "JOURNAL" for the 12th inst., passed first class in the Honours Grade at the last examinations in "Gas Manufacture," gains the bronze medal and the prize of £2 presented by the Salters' Company. He secured last year the second prize (£1 and a bronze medal) in the Ordinary Grade. Mr. Smith is with Messrs. E. Cockey and Sons, Limited, of Frome, from whom he received his training.

Mr. A. J. HOPE, who for the past seven years has been Assistant-Manager of the Halifax Corporation Gas-Works, has been provisionally selected to fill the position of Superintendent of the Effingham Street works of the Sheffield Gas Company, for which applications were recently invited in the "JOURNAL." The vacancy has been caused by the present Superintendent (Mr. T. H. Hack), who has held the appointment for the past six years, being entrusted with the charge of the new works at Grimesthorpe, the first section of which will be ready for making gas during the coming winter.

On the 21st of April last, the "Southern Daily Mail" announced that, in consequence of the action of the Directors, Mr. S. B. DARWIN, the Secretary and Manager of the Portsea Island Gas Company, had tendered his resignation; and it was stated that in six months from that time Mr. Darwin would "cease to be connected with the Company as its Secretary and Manager." The matter was alluded to in these columns; and it may be remembered that the reported resignation was denied by Mr. Darwin. But, according to a statement which appeared in the above-named publication last Friday, the original announcement "only erred in being premature." It goes on to say: "To-day (less than six months from the first notification being made), Mr. Darwin ceases to be connected in any way with the Portsea Island Gas Company, to whose interests he has given the best years of his life. We learn from a perfectly reliable source that what happened in April last was that, in consequence of a change of policy on the part of the directorate, Mr. Darwin relinquished the secretaryship of the Company, and, at the Directors' request, became Chief Engineer. They were frequently pressed to give a reason for wishing to make the change; but none was assigned. Mr. Darwin has served the Company in the dual capacity for twenty years; and there has been no suggestion made of any dereliction of duty or incapacity on his part. Not unnaturally, Mr. Darwin felt very keenly the circumstance of being compelled to take a subordinate position; and he has therefore tendered his resignation."

METAL WORK FOR PUBLIC STREET-LAMPS.

THE subject of the appropriate and decorative treatment of street-lamp supports, and interior gas and electric light fittings generally, is one that the "JOURNAL" cannot leave alone for long together. Many hundreds of new and additional street-lamps are fixed in the United Kingdom every year; and, similarly, thousands of gas fixtures are "installed," to use a phrase with which the electricians have familiarized us, in the residences of rich and poor. Yet we have continuing reason for lamenting the neglect of the opportunity thus provided for artistic treatment of a whole order of necessaries of modern life, by those who ought to seize every opening for raising the popular taste for applied art. The work of lighting streets and interiors has to be done; and done it is, by means of appliances turned out by the gross, by piecework. All that science, and skill, and power of organization and business capacity can do is done to supply the people of England with the best and cheapest artificial lighting. Nowhere is the electric lighting service so reliable, or the gas so cheap, so pure, and of such uniform quality. The lamp-oil which is so largely burnt by the poor, especially in country places, pays not a farthing of taxation; and consequently the people get their light for the smallest possible outlay. But when one turns from contemplating the illuminant to study the shape and construction of the fitting, or the utensil, by means of which it is applied to its proper use of shedding light where it is wanted, satisfaction nearly always yields to disgust when the observer is able to contrast what is with what might be. We are certainly not an artistic people. There is no denying the impeachment. Our lamp-posts and gas-fittings "give us away" as hopeless barbarians, for whom art has no real attraction.

In these columns we have over and over again set forth how differently these matters are managed in France, where, as the phrase has it, "everbody is a bit of an artist." Not that there is any help for us in following French fashions in lamp-posts and gas-fittings. There is much about the most admired creations of the French designers of these appliances that does not commend itself to the admiration of the critic who bears in mind the differences that separate French and English problems of civilization and necessarily mould their solution. The point is that the French care for the æsthetics of common features of their towns, such as the street-lamps, while we do not. They do consciously design lamp-posts with a view to making them things of beauty as well as useful articles. We leave all such matters to the Town Surveyor, who orders his lamp-posts from the ironfounders, and prefers such patterns as he can depend upen getting "out of stock." The Town Surveyor is a practical man. He knows his business. But his taste in lamp-columns and lanterns is apt to be safest when he confines himself to the simplest kinds, in which it is impossible for anybody to go far wrong. It is when he intends to carry the matter a little farther —to choose a "Jubilee" lamp-standard for an important street centre—that he goes into the outer darkness where there is not a glimmer of a true sense of art to be perceived.

It is with much satisfaction that we discover that we are not alone in lamenting the failure of modern artists to realize the possibilities of the lighting service. There has been recently an Art Metal Exhibition at Westminster, which was critically noticed in the "Ironmonger" by May Morris. The criticism is one of the best efforts in this direction that has ever come under our notice. The writer declares that one of the tasks she —for we assume the femininity of the name—had put to herself in wandering round the exhibition was "to discover what inventive ingenuity has been devoted to the question of fittings for electric light." This is obviously an important question for the present and future; and the critic has "reluctantly come to the conclusion that our best decorative artists do not apparently care to give it much thought." Just so. The writer goes on to remark that candle-light has been easy to cope with. "Nothing can be more charming or more becoming to beauty than the soft radiance of many lighted brass chandeliers with which some women are still wise enough and luxurious enough to illuminate their reception-rooms. *Of gas, the less said the better.*" [The italics are ours.] Of course, the superior beauty of candelabra as compared with all newer kinds of artificial light fittings is to be explained in a variety of ways. Candle-light is beautiful in itself; and candles, as soon as they were first produced, fell into the hands of true artists, who had a correct feeling for the way in which they could be made decorative as well as useful. Gas, unfortunately, came into use at the dullest and deadest period for art in the history of the civilized world. It was contemporaneous with "Churchwarden Gothic;" which is as much as to say that it never had a fair chance of artistic treatment in or out of doors. But what of electric light? Surely, if there is any reality in the renascence of art of which so much has been heard during the last few years, this, the youngest of artificial illuminants, might be expected to have come in for some of the beautiful garments with which a new baby is due to be adorned. Alas! no. The critic of the "Ironmonger" declares that "as part of the scheme of interior decoration, I do not think electric light has been often successfully treated. There is something paltry in many of the contrivances; and a sham chandelier with sham candles and a sham flame, in which lurks the light itself,

does not satisfy anyone as appropriate treatment. There are many of these 'notions' in the exhibition, and till now I have managed to avoid mentioning them." But sooner or later the mention has to come; and then it is a pitiful tale of imitation candles stuck upon imitation candlesticks, which one is invited to take as representing the best that modern art can do with one of the greatest marvels of modern science and industry.

It is quite true that "in pressing this new force into domestic service, we have got to work at the idea till we evolve satisfactory designs to fit its uses. The possibilities in lighting seem to me to lie," says the writer, "in the flower-like drop-globes often used. But there are obviously infinite possibilities; and I repeat that our cleverest decorative artists ought to consider this branch of design more than they have hitherto done." The trouble is that the artist does not arise when called for. Gas has been waiting for him for nearly a century; and few have been the indications that there is a possibility of his appearance. It is one of the disappointments of modern civilization that men and their productions multiply, but do not advance; and this is especially true of all that appertains to art.

We give herewith a couple of examples, taken from an American periodical, which show that the United States artificers are not breaking new ground successfully in the direction so carefully avoided by English craftsmen. The egg-stand device

to the left is by Winslow Bros., of Chicago, and represents the latest triumph of American smiths' work as applied to the display of an electric arc light. The other is an exercise on an obviously French theme, for gas, by a well-reputed American smith—John Williams, of New York.

It must be conceded that the modern metal worker has to solve a more difficult problem than the ancient blacksmith who was employed to make a cresset or a candlestick. When Quentin Matsys had hammered out one masterpiece, he was not required to produce it by the hundred. This is the controlling consideration in the case of the modern metal worker. Supposing the artificer of the present day were to succeed in producing a pleasing device, whether for a street-lamp column or a house-fitting, success would be manifested by a rush of orders for the same "pattern" until its embodiments would nauseate the beholder. Just as with musical art, no sooner does a composition catch the public ear than its reiteration from all sides converts it from a thing of beauty into a positive infliction. The critic of the "Ironmonger" appears to think that electric lighting pendants might be satisfactorily designed upon the drop-globe "motive." But how many of them? There is a highly effective suggestion for a fitting of this kind in the falling stars of a good sky-rocket, with their tails of golden sparks. One would not mind a few of such pendants, for public rooms, though they are anything but restful of aspect; but the pitiless multiplication of the notion would be wearisome in the extreme. In this respect it is easy to have too much of a good thing.

At the present moment, in London, the much-abused Works Department of the London County Council are engaged in replacing the time-honoured gas-lamp pedestals of Waterloo Bridge with brand-new posts for electric arc lamps. It will be remembered by gas engineers that just twenty years ago, a determined effort to improve public street lighting in London was made in this line of thoroughfare by Mr. Corbet Woodall, then Engineer of the Phœnix Gas Company. The original gas lanterns on the parapet of the bridge were massive constructions, the heavy metal framework of which was exhibited by the glimmer of a miserable gas-burner within. The object of the lanterns seemed to be to keep in the light of the gas, such as it was, as much as possible. Of late years, though the old monumental four-legged lamp standards have remained, the lanterns surmounting them have been of a light, well-glazed square pattern, containing a pair of flat-flame burners which lit the bridge well enough without throwing too much glare upon the surface of the stream below. The County Council are doing away with the standards, and fixing light cast-iron columns in their place—a work which is necessitating a good deal of cutting of the granite parapet. Of the new lamp-posts, the best that can be said is that they are inoffensive without the lanterns. What the lighting will look like when finished after the new pattern, remains to be judged. We hope to criticize it, at the proper time, as an example of the best that modern street-lighting practice, according to English ideas, can offer for a site which is part of the centre of the British Empire.

The "Builder" for last Friday week contained the following editorial note on the matter here referred to: "A piece of County Council vandalism is in course of perpetration at Waterloo Bridge which ought to be energetically protested against. The cast-iron lamp standards on the bridge are of unusual and very dignified design. They were obviously intended to suit the monumental style of the bridge, and may be regarded as part of the design. Three or four of these are now being removed—or rather have been removed—to make way for modern thin cylindrical lamp-posts of perfectly inferior character. We are informed that these are for electric light, and that the remainder of the old lamp-posts will remain. We presume it has not occurred to anyone concerned that they are thus spoiling Waterloo Bridge. Surely the old standards could have been adapted to carry an electric light lantern; and even if they could not, the new posts might at least have been designed in the same style and proportions as the old. It is, as far as we can see, a very stupid piece of work, and a wanton injury to the effect of our grand bridge."

NOTES.

A Comparison of Standards of Light.

M. Laporte has carried out some experiments with the view of ascertaining the relation of the different standards of light one to the other; and the results have been published in the "Bulletin de la Société Internationale des Electriciens." He selected as his standard an incandescent electric lamp; and his comparisons were made with the carcel lamp, the Hefner-Alteneck amyl-acetate lamp, paraffin candles, and decimal candles. The results are as follows:—

	Decimal Candles.	Carcel Lamp.	Hefner Lamp	Paraffin Candles.	Standard Lamp.
Decimal candle .	1·000	0·104	1·13	0·955	0·305
Carcel lamp .	9·600	1·000	10·90	9·200	2·930
Hefner lamp.	0·885	0·092	1·00	0·815	0·268
Paraffin candle .	1·050	0·109	1·23	1·000	0·319
Standard lamp .	3·280	0·341	3·72	0·193	1·000

Illuminating Power and Flash-Point of Petroleum Oils.

There have been many complaints of the common American petroleum oil of 21° C., Abel test, imported into Germany—not, however, as in England on account of the alleged "deadly low flash-point," but on the score of deficiency of illuminating power and ready explosibility. It was argued that the evil might be remedied by fixing a standard candle power for these oils; but Herr R. Kissling mentions in the "Chemiker Zeitung," by way of commenting upon this argument, that there is no known connection between the illuminating power of petroleum and its safety in use. Moreover, it would be exceedingly difficult to fix a minimum candle power for lamp oils, owing to the practical impossibility of making reliable photometrical tests upon lamps with wicks. Nor does the proportion of paraffin in a burning oil bear any determinable relation to the illuminating value of the oil, in the small proportions in which it usually occurs in the commercial article. It is possible to increase the illuminating power of an oil by adding spermaceti or paraffin to it in considerable quantity; but if the weather should be very cold, this solid would settle out of the oil, and consequently affect the illuminating power in this way. Practically, Herr Kissling does not see that anything more than the Abel test is required to safeguard the users of petroleum lamp oil in Germany—the flash-point being more than 3° Fahr. lower than the law of England requires.

Strengthening Iron Castings.

A curious observation on the production of molecular changes in cast iron by vibration is due to Mr. A. E. Outerbridge, as described in a Franklin Institute report. It appears that, having occasion to test for strength a number of sample cast-iron bars, Mr. Outerbridge detected in some of the specimens an amount of deviation from the expected standard which aroused his curiosity. He found that the only assignable cause for the increased strength was the fact that the specimens, contrary to the usual custom, had been rumbled in a mill in order to clean them. Mr. Outerbridge followed up this clue with a careful and systematic investigation of the effect of vibration upon cast iron; confining his inquiry in the first place to small castings. The principal fruit of this investigation has been, as the report states, to upset some of the ideas previously prevalent concerning cast iron; so that whereas formerly it was thought necessary to protect small and light iron castings from shock, it is now made apparent that such articles may be

generally strengthened and relieved of their internal cooling strains by judicious treatment in this way. It has been found that where the proper conditions are observed, there will be a decided gain of strength in almost every case—at times rising as high as 35 or 40 per cent. for rumbled as compared with unrumbled bars of the same composition. For his meritorious work in this field, Mr. Outerbridge has been awarded the John Scott Legacy Premium and Medal.

The Condition of Boiler Furnace Efficiency.

Mr. W. H. Booth re-states, in the "American Machinist," the truth established by Herr F. Siemens—but not as yet generally understood or appreciated—as to the proper way of heating surfaces by flame or hot gases. As Mr. Booth remarks, the main principle is this: No substance will ignite unless it is first raised to a certain temperature; and it will not burn freely unless allowed to get hotter than the minimum temperature of ignition. In the case of coal and coal gas, this minimum temperature of ignition may be taken at 800° Fahr., and of continuous combustion at 1000° Fahr. A full furnace temperature may well be 2500° Fahr., which is amply sufficient for throwing off large volumes of gas from freshly-charged fuel, and setting it burning freely. But if we allow these freshly-ignited gases to flow among a nest of cold-water tubes, the flame will be so cooled that it will either become imperfect or go out altogether. This fact explains the reason why such excellent results have been attained by boiler-settings in which the furnace and combustion chamber are kept from the cold metal—sometimes being placed outside the boiler itself. The great object is that of permitting the flame to burn itself out, and only to permit the hot products of combustion to come into contact with the cold boiler surfaces. Of course, the principle requires to be applied with discretion; experience alone being competent to direct how much brickwork should go to the construction of a boiler furnace, and how it should be disposed. It may be placed so as to show a cellular structure; the plates being exposed at the openings only. It may also be placed in the flue as a series of narrow rings, each of which will stop the flow along the plates of any stream of gas from the furnace. The latter device was patented by Herr F. Siemens; but information respecting its use is wanting.

A Discussion of the Electrolysis of Gas and Water Pipes.

The subject of the electrolysis of gas and water mains by currents of electricity derived from electrical tramways is discussed by Mr. Albert B. Herrick in "Engineering Magazine." The phenomenon is simple, and capable of easy explanation. Following the usual custom of working trolley-wire tramcars, the trolley-wire is fed from the positive pole of the generator; the current passes through the motors, performing its work of propelling the car, and is then delivered to the rails So far the current is confined to a definite path. On reaching the rail it may either follow the rail itself back to the power station, or ramify through the earth. It invariably follows the path of least electrical resistance. Sometimes it travels by the gas and water mains; but in passing from one metallic body embedded in the earth to another, the current always carries with it a portion of the substance of its late conductor. It is this action which constitutes electrolysis of the rails when the current leaves them to seek the hospitality of the street mains, and of the latter when it quits them to return to the power station. It is evident that wherever open joints occur, either in the rails or the mains, the current will bridge the gap at the expense of more electrolysis. This is the *rationale* of the operation, of which we are likely to hear more in the future. If the rails could be made and maintained as a continuous conductor, capable of taking all the return current, the trouble of electrolysis would not arise; but the condition is by no means easy of fulfilment. Mr. Herrick takes the view that there is no panacea for the evils arising from electrolysis, but that cure or palliation must be sought by attention to details. Fortunately, cast-iron pipes and fittings do not suffer from electrolysis so rapidly as wrought-iron pipes or lead and brass connections. The latter are very quickly attacked. Gas-pipes carrying an insulating medium are not so subject to this mischief, unless the ground return of the tramway is in a very bad state. Mr. Herrick describes the tests for vagrant currents, and gives directions for restraining them and minimizing their effects. He raises a very debatable point, however, by declaring that "if loam or clay be charged with coal gas or sewer gas, the resistance is greatly reduced." This statement conjures up the ghost of "contributory negligence" in anything but a pleasant shape.

Petroleum Vapour Burners.

In the issue of the "Engineer" for July 15, there appears a useful illustrated summary, by Mr. J. S. V. Bickford, of the known practical methods for producing and burning petroleum vapour by means of modified bunsen and blow-pipe burners. The most obvious way of burning this vapour is by a plain jet; the oil being previously vaporized by heating in some kind of retort. Mr. Bickford describes the burner he used for experimental work with petroleum vapour; and he remarks that one of the essentials of all arrangements of the kind is a device for steadying the generation of the vapour. Next, as regards the combustion of the vapour, it is the fact that if a jet of plain petroleum vapour is issuing from a nozzle at a velocity due to a pressure exceeding about 1 lb. per square inch, it will not burn unless it is either kept in contact with a flame, or impinges upon some solid obstruction. It is also found that the colour of the flame depends upon the distance from the nozzle at which the first ignition is effected. This, of course, is a question of the proportion of air that mixes with the vapour before ignition. In general, the vapour jet is kept alight by the use of an interrupter of some sort—usually the vaporizer itself. But sometimes the vaporizer is not found to offer sufficient resistance, as in the Wells heating and lighting burners; and other means have to be used to increase the effect. The construction of the Wells burner is described. The actual effect of interrupting a jet of petroleum vapour is to check the flow, and thus to permit of its remaining alight. In the Seigel patent lamp, and in many others, the interrupter is in the form of a truncated cone. Mr. Bickford remarks that some peculiar effects can be produced with a sheet of course gauze or a fine grating held at different distances from the nozzle from which the petroleum vapour is being discharged. Unexpected difficulty was encountered when the attempt was made to produce a petroleum vapour blowpipe by copying the usual arrangement for gas blowpipes of a pair of concentric tubes. The air blast blew out the flame. Mr. Bickford recounts the stages through which he passed in his endeavour to produce a petroleum vapour blast flame that should be both smokeless and noiseless. He found that it is not practicable to make an economical burner of the kind that shall be absolutely silent in working. This could be done, he thinks, if the petroleum vapour could be mixed in a close chamber with all the air it needs for complete combustion, so that no addition of air at the point of ignition would be necessary. The article is interesting as a description of experimental work upon the bunsen burner from a different starting-point to that occupied when coal gas is the combustible used.

TECHNICAL RECORD.

GERMAN ASSOCIATION OF GAS AND WATER ENGINEERS.

The Annual Meeting at Nuremberg.

The Thirty-eighth Annual Meeting of this Association was held at Nuremberg, from June 29 to July 2, in accordance with the programme which was announced in the "JOURNAL" for June 7 (p. 1318).

Inclined retorts formed the subject of a report by Herr Reissner, of Berlin. He stated that 4485 retorts of this description were in use, and 2500 in course of erection, in England; while on the Continent 1392 were now in use, and 2655 in course of erection.

Dr. Leybold, of Hamburg, and Dr. Strache, of Vienna, both gave papers on "Water Gas." Dr. Leybold's was an exhaustive summary of the experiences with water gas gained during the past ten years in the United States, and in England and other parts of Europe. The following details of experiments carried out by the author at Brussels were, however, included in the paper: Various descriptions of German gas oils were used for the production of gas of 13 to 15 candle power. Blows of 3 minutes' and runs of 6 minutes' duration were adopted; and clinker was removed twice daily. A larger quantity of coke was consumed in the gasification of heavy oils than in that of light oils. Wages amounted to about 12s. 6d. per 353,170 cubic feet (10,000 cubic metres) of carburetted water gas made. The cost of producing this quantity of the gas from different oils, was approximately as follows:—

Oil Used.	14-Candle Gas.	17½-Candle Gas.
Petroleum (duty neglected) ..	£1 17 4 ..	£2 11 9
Gas oil from Halle	2 0 0 ..	2 16 0
Heavy oil from Halle	2 2 6 ..	2 19 3
Gas oil from Messel	2 3 6 ..	3 1 9

The two generators were actually in use only during the period from October to February, and even then were generally only worked during the day. The total make in this time amounted to 95,356,000 cubic feet; and the consumption of oil in the manufacture of 14-candle gas was about 26½ lbs. per 1000 cubic feet. The adoption of carburetted water gas on a considerable scale in Germany would therefore give a great impetus to the national oil industry.

Dr. Strache's paper discussed the chief points of his process for the production of non-carburetted water gas from coal, and the use of the gas for illuminating purposes by means of the incandescent system of lighting. The more important facts connected with Dr. Strache's system have already been given in the "JOURNAL."* The inventor hopes to be able shortly to reduce the consumption of coal in the production of simple water gas to 31 lbs. per 1000 cubic feet. He now imparts an odour to the gas by means of carbylamine of 50 per cent. strength, in place of mercaptan which he used formerly. The cost of odorizing the gas by carbylamine is about ⅓d. per 1000 cubic feet. The incandescent burners for simple water gas are made in five sizes, giving illuminating powers ranging from 22 to 130 candles. The consumption of gas varies from 48 to 68½ cubic feet per 1000 candle-hours. Dr. Strache considered benzene superior to acetylene as a carburetting agent for water gas.

* See Vol. LXX., p. 897.

Herr Liebetanz, of Düsseldorf, subsequently gave a paper on "Acetylene;" but it embodied no novel information.

Dr. Bunte, of Carlsruhe, gave a very interesting lecture, illustrated by numerous experimental demonstrations, on liquefied air. He was assisted by Dr. Sieder, of Munich.

The annual report presented to the meeting referred to the completion of the fortieth year of the existence of the "Journal für Gasbeleuchtung," which was first published on July 1, 1858, and the issue of which heralded by a few months the birth of the Association of which it has continued up to the present time to be the official organ. During the past year, conferences have been held with the Union of German Gasholder Makers; and the conclusions arrived at are embodied in a report, which will be issued shortly. A Committee appointed at the last annual general meeting of the Association to report on the Electrolytic Action of Tramway Currents on Mains, entered into negotiations with the Union of German Electricians; and a Committee of the latter body was appointed to assist in the investigation. Up to the present, the two Committees have been unable to meet together; but some work has been done by correspondence and exchange of literature. The conditions of labour in German gas-works have been carefully investigated by the Council of the Association; and reports on the subject have been collected from about seventy large works in various parts of the empire. The prize competition for Coke-Stoves promoted by the Association* resulted in descriptions and drawings of 35 stoves being presented on Sept. 1, 1897; but only 24 of the stoves were actually sent to the gas-works at Hanover by Nov. 1, for trial. These were examined by Drs. Plinke and Lubberger; and 14 were chosen for a closer examination, which is still in hand.

With regard to Water Supply, Herr E. Grahn, at the instance of the Association, undertook to collect statistics; and the first volume of his work on the "Water Supply of the German Empire" is now in the press. It treats of Prussia; and the remaining states will be dealt with in a second volume, which will probably appear at the end of the year. The first volume contains 400 tables, and gives information with regard to over 1200 places in Prussia.

The Photometrical Commission of the Association have held two meetings during the year, and have presented a provisional report to the meeting. The Gas-Meter Commission have investigated prepayment meters; and in the course of the next year, will collect information concerning the results of their introduction in various places. The Commission have also had under consideration two communications from the Imperial Standards Commission. The Committees of the Association appointed to investigate the subject of Heating by Gas and to collect Water Statistics, have continued their work, commenced in earlier years. The Commission on Inclined Retorts, which issued an exhaustive report last year† have during this year given special attention to the question of the patent rights with regard to them. The Instruction Committee last year formulated their views as to the training and instruction of technical men; and this year two attempts have been made to carry them out in practice. An eight days' practical course of instruction was given in the spring at the Chemical-Technical Institute at Carlsruhe; and eighteen gas managers and engineers availed themselves of it. The latest chemical aids to the regulation of gas manufacture, and to the valuation of raw materials and bye-products, were explained, both in the laboratory and on the local gas-works. Last October, a school for gas-fitters was opened at Dessau; and twelve pupils were admitted. The results so far have proved very encouraging.

The eighteenth volume of Gas Statistics has been issued during the past year, and includes the returns from 204 gas undertakings for 1896 or 1896-97. With few exceptions, the returns indicate a considerable increase in the production. The following are some of the most notable increases over the make of the preceding year: Berlin municipal works, 326,680,000 cubic feet; Charlottenburg, 70,634,000 cubic feet; Cologne, 49,450,000 cubic feet; Leipsic, 45,900,000 cubic feet; Dresden, 44,150,000 cubic feet; Düsseldorf, 42,380,000 cubic feet; Hamburg, 38,850,000 cubic feet; Elberfeld, 35,300,000 cubic feet; and Nuremberg, 17,650,000 cubic feet. The greater part of the increased consumption can be traced to the extension of the use of gas-engines and gas-fires.

The Association now has 1 honorary member, 600 members, and 144 associates. During the past year, there have been 36 members and 12 associates elected; while 17 members and 3 associates have been removed from the roll by death or otherwise. The number of affiliated Associations is seven. The Marks Association of Gas and Water Engineers, of which Herr A. Müller, of Charlottenburg, is President, held their eighteenth annual meeting in August last, at Salzwedel, and a winter meeting in February at Berlin. The members of the Association now number 159. The Mid-Rhenish Gas and Water Engineers' Association held their thirty-fourth annual meeting at Heilbronn in August last, under the presidency of Herr Merz, of Cassel. Several interesting papers were read at the meeting. There are 132 members of the Association. The Association of Gas and Water Engineers of Silesia and Lausitz held their twenty-ninth annual general meeting in August last, at Schweidnitz, when about half of the 112 members of the Association were present. Herr Thomas has been President of the Association for ten years, but has now retired in favour of Herr G. Happach, under whose presidency the next meeting at Glogau will be held. The Association of Gas, Electrical, and Water Engineers of the Rhine Provinces and Westphalia held their annual meeting at Bonn, in August last, under the presidency of Herr Söhren, of that town. A second meeting was held at Cologne in November last; and a social gathering in commemoration of the twenty-fifth anniversary of the foundation of the Association took place on March 20, in the same city. A fourth meeting was held in May last. The Bavarian Association of Gas and Water Engineers held their thirteenth annual meeting in April last, at Ansbach, under the presidency of Herr Ruoff, of Ratisbon. The Association has 108 members. The Association of Gas and Water Engineers of Saxony-Thuringia held their forty-fourth annual meeting on March 6, at Chemnitz. The President is Herr Achtermann, of Annaberg. The membership numbers 130. The seventh affiliated Association is the Baltic Association of Gas and Water Engineers, which has not at present issued a report for the year.

* See "JOURNAL," Vol. LXIX., p. 231. † *Ibid.*, Vol. LXX., p. 795.

THE CARBURATION PROCESS AT HASTINGS.

In the course of the remarks made by Mr. C. E. Botley upon Messrs. S. & T. Glover's paper on "A New Departure in Carbonizing," read at the recent meeting of the Institution of Gas Engineers, he gave a few figures showing the result of the introduction at the Hastings Gas-Works of the gas carburation process devised by himself and his son (Mr. C. F. Botley), and described by them in a paper read at the meeting of the Institution in 1897. We have received the following additional statistics in regard to the process, which is now only used to retain the naphthalene in the coal gas:—

In the year 1897, the quantity of gas sold was 366,426,000 cubic feet; and the oil account stood thus: Oil for process, 2940 gallons; deduct new oil used on works or sold, 226 gallons —leaving 2264 gallons used. This was disposed of thus—

Suspended	1352·00 galls.	..	59·71 per cent.
Recovered	850·75 „	..	37·57 „
Unaccounted for, or waste	61·25 „	..	2·72 „
	2264·00 galls.		100·00 per cent.

Used for carburation—	
Canneline, 205 gallons, at 10d.	£8 10 10
Tea rose, 2059 gallons, at 5·2d.	44 12 3
	£53 3 1
Recovered and used for carburetted water gas, &c., 850·75 gallons, at 3d..	10 12 8
Net cost of oil	£42 10 5

Total Cost of the Process.

			Per 1000 Cub Ft. of Gas Sold.
Oil, as above	£42 10 5	..	0·028d.
Other charges, including steam, labour, repairs, and allowance for interest	110 3 1	..	0·072
Total	152 13 6	..	0·100d.

0·100d. per 1000 feet sold, or (say) 1d. per ton.

Results of the Process.

Year.	Naphthalene Stoppages.		Average per Day.
1893	4948	..	13·55
1894	4167	..	11·41
1895	7125	..	19·52
1896	1667	..	4·55
1897	768	..	2·10
1898 (159 days)	210	..	1·32

Results Stated as Ratios.

Year.	Stoppages: Consumers.		Stoppages: Each 1000 Cubic Feet Sold.
1893	0·813	..	0 0157
1894	0·678	..	0·0128
1895	1·092	..	0·0207
1896	0 238	..	0·0047
1897*	0·100	..	0·00209

Notes and Comparisons, 1896 and 1897.

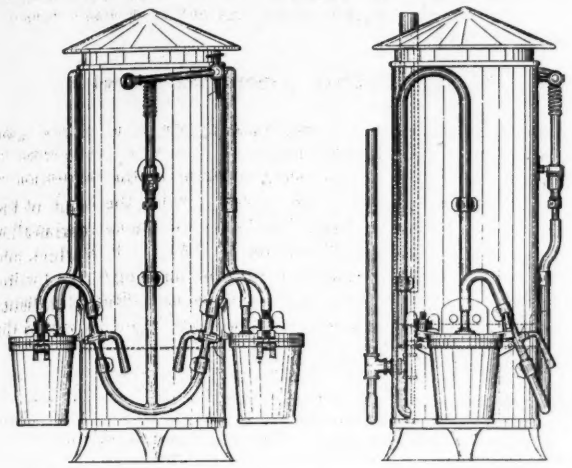
	Year 1896.		Year 1897.
Oil per 1000 cubic feet of gas sold	0·022 gall.	..	0·066 gall.
Oil suspended „ „	0·017 „	..	
Percentage of oil suspended	75	..	60
Gas carburated by one gallon of oil used (approximately)	45,000 c. ft.	..	166,000 c. ft.
Cost of oil per 1000 cubic feet for carburation	0·173d.	..	0·028d.
Total cost of process per 1000 cubic feet of gas sold	0·24d.	..	0·100d.
Water gas made during 1897	8·00 per cent.		
Cannel used „ „	1·82 „ „		

* Most of the stoppages were due to known causes other than naphthalene. The remainder may or may not have been caused by naphthalene.

REGISTER OF PATENTS.

Making Acetylene.—Ackroyd, J. & B., of Cullingworth. No. 16,344; July 10, 1897.

This apparatus (shown in front and side elevation) consists of an upper and lower water-vessel divided by a horizontal partition. A gas-holder is placed in the upper vessel, which is free to rise and fall on the same principle as if used for ordinary illuminating gas. A detachable generator is provided, the cover of which is preferably permanently fixed to the upper water-vessel. The gas-passage from the generator is connected to the cover, and passes up above the maximum level of the water in the upper vessel, and then down—entering the lower vessel at or near the bottom. The gas-passage from the lower vessel is connected to the top of this vessel, and reaches up above the maximum level of the water in the upper vessel. The water-supply passage between the generator and the upper vessel leaves the latter at a point below the minimum working level of the water therein, and is then bent down far enough to form a

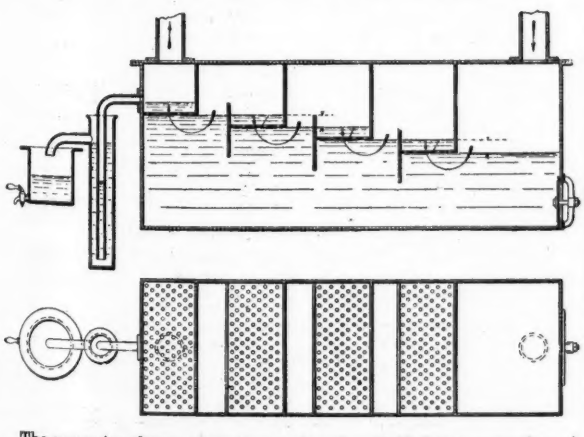


trap or water-seal; then up again, and connected to the cover of the generator. The passage is fitted with a valve normally kept closed by a spring; and a lever is provided arranged to be operated by a projection on the holder, opening the valve and admitting water to the generator when the holder falls to a certain point.

In operation, the water-level in the lower vessel is kept below the level of the cross partition, so as not to interfere with the passage of the gas. This is effected by fitting the filling aperture some distance below the level of the partition. A safety-device is fitted to the generator, consisting of a bent pipe in the form of a water-trap, and connected to a ventilating pipe. Between the end of the trap and the ventilating pipe an enlargement is provided, into which the water from the trap is forced, in case of excessive pressure—leaving a free passage to the ventilating pipe; and it is so arranged that when the abnormal pressure subsides, the water flows back into the trap.

Washing or Scrubbing Gases.—Lake, H. H.; a communication from Fellner and Ziegler, of Bockenheim, Germany. No. 17,644; July 27, 1897.

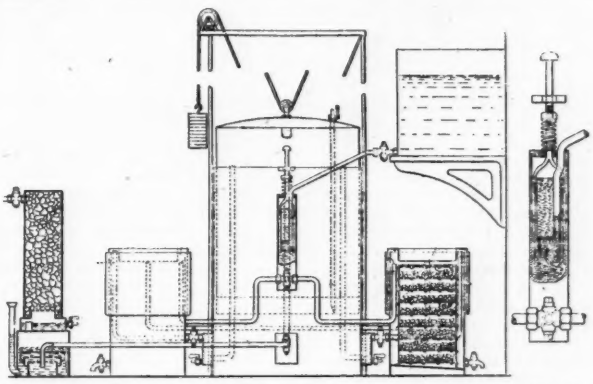
This apparatus for purifying gases by washing or scrubbing is designed to enable currents of gas to be freed from any impurities which they may carry along with them, or, in the case of mixed gases, to enable any particular gas to be absorbed by water or other liquid. In order to completely fulfil these objects, the apparatus is arranged to repeat the washing or scrubbing operation several times over in the same liquid; and means are provided whereby, when the pressure employed for forcing the gases through the washing or scrubbing liquid ceases to act, the liquid is prevented from being drawn back by suction through the gas inlet-orifice.



The apparatus shown comprises a chamber divided into a number of spaces or compartments by partitions extending from the roof. This latter contains the washing or scrubbing liquid; and the partitions are of gradually increasing length, and are so arranged that when the gas pressure is turned on, the liquid assumes different levels on opposite sides of each of the partitions—its surface taking a cascade or steplike form. The gas bubbles up under the edges of the partitions, commencing with the longest, and passes in this way from compartment to compartment. Between each pair of the partitions are arranged subsidiary partitions, the purpose of which is to assist the liquid to assume the different levels referred to; and from each of the main partitions extends a horizontally axial or perforated plate for the gas to bubble through. The gas, together with any impurity with which it may be charged, is admitted to the end compartment adjacent to the longest partition, and discharged from the other end compartment of the chamber. The horizontal grids may consist of perforated sheets of metal, which serve for breaking up the gas bubbles, and afford a maximum surface for the purifying or scrubbing operation, which accordingly takes place within the limits set by the level of the water through which the gas bubbles pass. The subsidiary short vertical partitions are arranged vertically at different levels in relation to each other, and extend through the whole width of the apparatus; while they are in all cases situated at such a distance from the top of the chamber as to leave ample space for the passage of the gases.

Manufacture of Acetylene.—Bull, J. C.; a communication from Josse and Defays, of Lille, France. No. 18,355; Aug. 6, 1897.

This apparatus comprises essentially two or more generators for containing the calcium carbide; a gasholder for storing and equalizing the pressure of the gas; a water tank or reservoir in communication with the generators through the medium of a special form of mercurial valve, adapted to be operated by the movement of the bell of the holder; and a washer or purifier through which the gas passes on its way to the burners.



The generators consist of suitably shaped receptacles adapted to be closed by a lid, so as to make a gas-tight joint (preferably by means of a water-seal), and also to contain a series of shallow trays which rest on each other, and which contain the calcium carbide. The bottoms of the trays may be perforated in any suitable manner; but they are preferably formed with cone-shaped projections on each side—the apices of the cones being cut off or formed with holes or perforations. It will be seen that the bottom of one tray forms the lid of the one immediately below it. Plug-cocks are provided at or near the bottom of the generators, to allow of the unused water and chalk being drawn off, and also to allow of the escape of air when the generator is started after being recharged.

On the lower outside casing or fixed portion of the gasholder is the mercurial valve referred to, and shown in detail at the right-hand side of the engraving. It is constructed on the principle of the difference in the densities of liquids—in the present case, on the difference between the density of mercury and water. As mercury has a density of 13·5 and water only of 1, it is necessary that the water column shall be 13·5 times higher than that of mercury in order that it shall overcome the resistance of the mercury.

In carrying this principle into effect, the present inventor uses a suitably shaped receptacle adapted to contain water, and within which receptacle is suspended another receptacle containing mercury. The outer receptacle is fixed to the outside casing or fixed portion of the holder. Dipping into the mercury contained in the inner receptacle, is an open tube or pipe for conducting the water from the tank or reservoir, the water in which is preferably kept at a uniform level by a ball-cock or the like. The inner receptacle is kept in its normal position—that is, with the mercury covering the end of the water-tube—by means of a spring, so that no water is able to pass from the tank or reservoir into it. At or near the bottom of the outer or fixed receptacle, is a two-way cock, communicating with either one of the generators which are situated below the mercurial valve. The pipes enter the generators in any suitable position; but their free or delivery ends are situated at or near the tops of the generators—means being provided to prevent the entering water from attacking the calcium carbide contained in any but the lowest tray which has been unacted upon.

A rod carrying the receptacle containing the mercury is acted upon by means of a projecting stop or bracket carried by the upper portion of the gasholder, when this portion of the holder nearly reaches its lowest position—that is to say, when there is very little gas left in it.

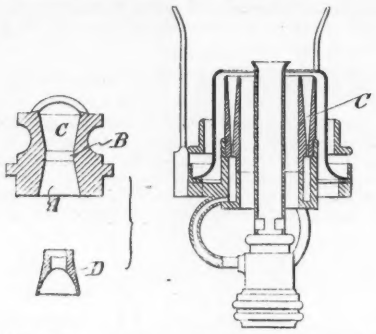
As the gas is expended, the holder sinks, and thus operates the rod and depresses the mercury-containing vessel. This causes the end of the water-pipe to become uncovered more or less, and so allows a certain proportion of water to flow in from the tank or reservoir. The water overflows the inner receptacle into the outer one, and so raises the height of water contained therein, and therefore increases the pressure. This allows an equivalent amount of water to flow into one of the generators and act on the calcium carbide. The generated gas is led from the upper portion of the containers by means of pipes into the holder, the bell of which will then rise, and the stop thereon will no longer engage with the rod of the mercury-containing receptacle, which will be returned to its normal position by means of the spring, and so prevent more water flowing into the generator until the bell of the holder again descends.

Gas-Burners.—Sugg, W. T., of Regency Street, Westminster, S.W. No. 19,354; Aug. 21, 1897.

This invention relates to "a gas-burner provided with an expanding chamber, in which the gas can expand so that its velocity is decreased before it arrives at the point of ignition."

In the accompanying engraving are shown (in sectional elevation) the invention as applied to a table-top flat-flame burner, and to a Sugg's "London" argand burner.

In the former, the lower part A of the burner is made of conical or similar shape, leading up to a contracted opening B, with parallel sides. From the opening B, the sides of the passage through the burner expand, as at C. The angle of inclination will vary slightly, according to the size of the burner and the illuminating power of the gas; but generally the inclination may be said to vary from 10° to 20° from the vertical. In a burner to be used without a governor, the area of the

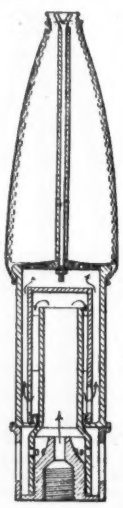


contracted part B of the gas-passage should be about equal to, or slightly larger than, the area of the slit in the rounded top; but as it is impossible, from the nature of the tools employed, to produce the proper form of expansion chamber with such a small opening, a plug D is used to reduce the size of the opening. When, however, a governor is applied, so that the pressure of the gas to the burner can be reduced to 2-10ths, 3-10ths, or 4-10ths, according to the size of burner, this extra constriction is unnecessary; and the size of the opening B, as compared with the gas-slit, may be as 6 to 1, or thereabouts.

In the argand burner, the conditions are slightly modified; and the length of the expanding chamber C is increased, and its width in cross section reduced. In this case, there is no issuing slit; but the gas burns at the outlet of the expanding chamber. The same principle is, however, involved—namely, to delay the upward movement of the gas. This is effected by the expansion; so that, "at the point of ignition, the velocity is so reduced, whereby the gas is longer in contact with the air, and more perfect combustion takes place, thus reducing smoke. A better-shaped flame is also ensured; because what pressure there is, is spread evenly over the whole of the gas slit or opening; and the formation of forks or points is prevented. If more perfect combustion takes place, then there is obviously an increase of illuminating power, as the carbon, instead of being given off in the form of smoke, is consumed."

Incandescent Gas-Burners.—Salzenberg, E., of Crefeld, Germany. No. 20,319; Sept. 3, 1897.

The present invention is said to be based upon the discovery that, when the pressure of the gas is considerably increased upon an incandescence body, the body "emits a golden yellow light very agreeable to the eye, and which light displays objects in their natural colours." Hitherto, the patentee remarks, it has been impossible to make use of greater pressure of gas than usual, because of the sensitiveness of the incandescence body, and because the suspended body is broken up by high gas pressure, and in consequence of its light weight is blown away from the burner. The applicant has, however, discovered that yellow light and a great intensity of lighting can be obtained by means of a considerably increased gas pressure, on condition that the incandescence body is made use of in such manner as to render it possible to withstand the high gas pressure without breaking up and being blown away.

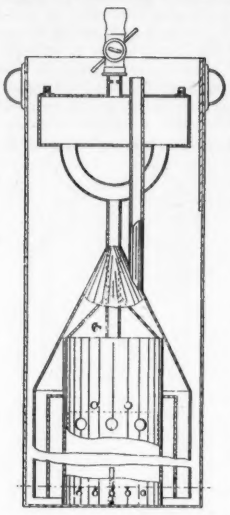


His proposal is that the gas should be supplied to the burner at a pressure of about three atmospheres or upwards; and in order to render this possible, the incandescence body is attached to the burner by means of incombustible fastenings in such a manner as to be capable of withstanding the pressure. By this means, it is claimed that a single incandescence jet of the usual size can evolve a light of up to 1000 candles. On application of extremely high gas pressure, pointed flames are evolved when a single mantle is used, which flames pass out between the meshes of the mantle; but this drawback can be avoided by drawing several mantles in the unburned state over one another, and then incinerating the whole. Or a single mantle constructed of several layers of fabric may be employed; the pointed flames formed on the innermost mantle layers then impinge against the threads of the outer layers, and are thereby broken up and prevented from passing through.

To fasten the incandescence body, it is proposed (as shown in the engraving) to place the mantles one upon another in the unburned condition, and incombustible threads of asbestos, platinum, or the like passed through them. After the combustion of the mantles, these threads are so secured around the outermost layer of incandescence material, as well as to the burner or burner support, that the incandescence body is enclosed with a netting of incombustible threads or wires, and cannot be blown off or destroyed by any high gas pressure. The mantle support, which, in consequence of the great heat, may be easily burned away, is preferably protected by a cover of incombustible material—such, for instance, as asbestos, platinum, or fire-clay.

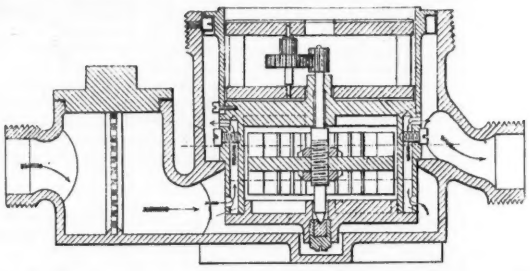
Acetylene Gas Producer.—Thiersant, H. de, of Fulham Road, S.W., and Coulson, W. A., of Kyverdale Road, N. No. 29,571; Dec. 14, 1897.

In this arrangement (as shown) there is an outer vessel containing water, and receiving the main portion of the apparatus, which consists of a cylinder communicating by means of curved tubes, from the bottom, to an upright tube, which in its turn communicates with a receiver below, into which the receptacle for the carbide is placed. Outside this receiver, and about two-thirds of its height, is an outer gallery communicating with the receiver by means of small holes at the top and bottom. Covering the carbide receptacle and the receiver with its outer gallery, is a cone-shaped vessel attached at the top to an upright tube, and descending at an angle until it reaches close to the side of the outer vessel, when it descends perpendicularly to within about one-third of an inch from the bottom. A tube is inserted near the top of this cone-shaped covering, for the purpose of carrying away any surplus gas produced. At the top of the cylinder first named is a tube with a tap permitting gas to proceed into the supply-pipes; and at a distance of about 18 inches from the tap, and attached to the supply-pipe, is a small metal tube filter containing amianthus and broken pumice stone. After passing through this filter, the gas is ready for use. The working is automatic, as water only comes into contact with the carbide, and produces the acetylene when sufficient has been burnt or allowed to escape; and the pressure on the water is thus removed from underneath.



Water-Meters.—Lake, H. H.; a communication from F. Lux, of Ludwigshafen, Germany. No. 10,043; May 2, 1898.

This invention relates to a vane-wheel water-meter, capable of measuring water flowing through it in the direction opposed to that of the usual flow. The apparatus is arranged in such a manner that the passages provided in the walls of the measuring cylinder are horizontal, one above the other, and are of the same size, but run in opposite directions. Upon both the base and cover of the measuring vessel or space, are provided stemming or damming ribs of triangular cross-section, so arranged that



water flowing in from below strikes against their vertical faces, while water flowing in from above strikes against their inclined faces. In consequence of this, the vane-wheel, in spite of being more heavily loaded with the water flowing in the backward direction, makes exactly the same number of revolutions, only in the reverse direction, for each unit of measurement of water flowing backwards as for each unit flowing in the forward direction.

APPLICATIONS FOR LETTERS PATENT.

15,174.—Featherstone, J. L., "Valves." July 11.
15,175.—Marrs, W., "Acetylene gas generator." July 11.
15,179.—Delmouly, E., "Generating acetylene gas." July 11.
15,207.—Mactear, J., "Obtaining cyanogen compounds." July 11.
15,212-3-4.—Dillberg, G., "Treatment of calcium carbide for the production of acetylene gas." July 11.
15,229.—Whitbread, S. J., "Coin-freed gas-meters." July 11.
15,241.—Boss, J., "Generating and utilizing acetylene gas." July 12.
15,245.—Collis, A. B., "Gas and oil engines." July 12.
15,260.—Brown, C., "Gas-engines." July 12.
15,271.—Miller, C. A. & F. J., "Generator for acetylene gas." July 12.
15,275.—Foster, H., "Gas and other engines." July 12.
15,291.—Keith, J., "Pumping or compressing and mixing gas and air." July 12.
15,367.—Armitage, J. A., and Ramsden, E., "Acetylene generator. July 13.
15,382.—Southall, J., "Gas and oil engines." July 13.
15,394.—Myers, R., "Acetylene generators." July 13.
15,396.—Baumgarten, D. L., "Acetylene gas generators." July 13.
15,404.—Kollenberg, H. F., "Fastening and securing the lower part of mantles for incandescent burners." July 13.
15,414.—Pierron, L., "Compound bodies or substances for producing automatic ignition of combustible gases." July 13.
15,423.—Bohne, M., "Acetylene gas generators." July 13.
15,462.—Wigham, J. R., "Illuminating buoys and beacons." July 14.
15,606.—Aulton, H., "Acetylene gas lamps." July 16.
15,624.—Kirkham, W., "Reversing valves for regenerative gas-furnaces." July 16.

CORRESPONDENCE.

[We are not responsible for the opinions expressed by correspondents.]

Meeting Extraordinary Claims Out of Reserve Funds.

SIR,—So far as I am aware, there is no legal definition of the expression "extraordinary claim or demand" in the Gas-Works Clauses Act, 1847, beyond that which is afforded by the more ample phraseology of later Acts by which the dual application of the reserve fund to supply a deficiency in dividend and to meet an extraordinary claim has been differentiated, and two distinct funds have been set up—the one to supplement the dividend, and the other to meet claims. This later phraseology is "any extraordinary claim, demand, or charge which may at any time arise against or fall upon the company from accident, strikes, or other circumstances which in the opinion of [the controlling authority] due care and management could not have prevented."

But apart from this, the language of the 1847 Act makes it quite clear that the claim or demand must be one that "arises *against* the undertakers." The voluntary construction of a main could scarcely be brought within these terms. In the report of the Barnsley case it is only stated that the Company "had to" construct a main. The expression is vague, and it might possibly be intended to denote some compulsion from without which the Company could not resist. But the case was unopposed, and was very briefly reported; and I fear "Inquirer" will not be able to get much light out of it.

H. D. ELLIS.

Commercial Gas Company, Stepney, E.,
July 20, 1898.

Illuminating Gas from Sludge.

SIR,—In the last issue of the "JOURNAL" you report that, at the recent annual conference of the Association of Municipal and County Engineers in Edinburgh, Mr. Cameron read a paper in which reference was made to the production of illuminating gas from sewage. As bearing somewhat indirectly upon it, I made some experiments with sludge from the sewage works of the Corporation of this town some twelve months since, with a view to ascertaining whether there were sufficient gases existing in the sludge to make it worth while to carbonize. I had a whole week's test, the result of which was as follows:—

Summary of Tests.

Date. 1897.	Gas Made per Ton. Cub. Ft.	Illuminating Power. Candles.	Moisture. Per Cent.
June 11	3680	11·00	63
„ 14	3680	12·00	40
„ „	3920	15·00	40
„ 15	5360	16·10	35
„ „	6000		
„ 16	5360	16 30	35
„ „	5120		
„ „	5440	16·74	27
„ „	5760		
„ 17	5600	16·10	27
„ „	5840		
„ „	6320	14·70	27
„ „	6560		
„ „	7200	7·60	25
„ „	6000		
„ 18	5200	8·40	25
„ „	5520		
„ „	5680	8·20	25
„ „	5120		
Average	5440	12·92	33

It will be apparent that, as only 5440 cubic feet of gas of an illuminating power of 12·92 candles was obtainable per ton, on an average, it was not economical to do anything with the refuse. The average moisture in the material was 33 per cent.; and there was the further almost fatal objection that the sludge contained quantities of minute organisms.

It occurs to me that these tests may have some slight interest, although upon different lines from those indicated in Edinburgh.

E. A. HARMAN.

Huddersfield, July 22, 1898.

Scunthorpe Gas and Water Supply.—The Urban District Council of Scunthorpe, near Doncaster, have decided to promote a Bill next session to authorize them to manufacture and sell gas and supply water. Messrs. Stevenson and Burstal have been appointed Engineers. The first part of the contract for the water supply—viz., the deep boring which is to be sunk into the red sandstone—has been let for £4495. It is estimated that the total cost of providing the town with a proper supply of water will be £16,000.

Is Gas Lime Injurious to Fish?—Attention was called last week at the meeting of the Devon Sea Fisheries Committee to the deposit of gas lime on the shore of Torbay by the Torquay Gas Company. Colonel Studdy said the bye-laws prohibited any poisonous matter being sent into the sea; but the Watch Committee, whose attention was directed to it eighteen months ago, had done nothing. It was proposed that the Watch Committee should be instructed to deal with the question immediately, with power to employ an expert and, if necessary, to institute a prosecution. Colonel Studdy held that after last year's Biological Society's report, in which it was distinctly stated that gas lime was injurious to fish, an expert was quite unnecessary. As representing the Torquay Gas Company, of which he is a Director, Mr. W. Ball remarked that when he laid the matter before his colleagues their instructions to the Manager were that he should give the Committee's representative every facility; and it was agreed that if the gas lime were really proved to be injurious to fish, the Directors would do everything they could to remove it. Mr. Sandars declared that as he passed the gas-works that day he saw several tons of gas lime deposited on the shore; and the water was discoloured for some distance. The question was whether the lime was injurious to fish. The Chairman (Mr. E. Windeatt) said the analyses did not show that it was. The resolution was adopted.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following further progress has been made with Bills:—

Bills read a second time and committed: Keighley Corporation Bill Paignton Improvement Bill, St. Helens Corporation Bill.

Bill reported, with amendments: Mid-Kent Water Bill.

Bills read the third time and passed: Clacton-on-Sea Gas and Water Bill, Coventry Corporation Gas Bill, Gaslight and Coke Company Bill, Leyton Urban District Council Bill, Maldon Water Bill, Middlesbrough Corporation Gas Bill, Plymouth and Stonehouse Gas Bill, Southampton Gas Bill.

HOUSE OF COMMONS.

The following further progress has been made with Bills:—

Bills reported: Gas Orders Confirmation Bill (No. 2), Newhaven and Seaford Water Bill.

Bills read a second time and committed: Forres Water Bill Heywood Corporation Water Bill, Water Orders Confirmation Bill.

Bills read the third time and passed: Felixstowe and Walton Water Bill, Folkestone Water Bill, Gas Orders Confirmation Bill (No. 2), Newtown Water Bill.

HOUSE OF COMMONS COMMITTEES.

In the "JOURNAL" for the 14th ult. (pp. 1391-2), we reported the proceedings on the Brompton and Southend Water Bills—the first two in Group E. The remaining Bills in the group—the Cranbrook, Higham, Mid-Kent, Haselmere, and Wey Valley—were subsequently considered by Committees presided over by Colonel Gunter and Sir Charles Dalrymple respectively.

CRANBROOK DISTRICT WATER BILL.

Some preliminary conversation passed regarding this Bill and Bills which were being promoted by the Mid-Kent, the Higham and Hundred of Hoo, and the South Kent Companies; it being pointed out that to some extent they were connected one with another. It was agreed that the Cranbrook and the Mid-Kent Bills should be taken as competing; and that the former should be dealt with first.

Counsel engaged were Mr. Littler, Q.C., Mr. Balfour Browne, Q.C, and Mr. Rickards, for the Cranbrook District Water Company; Mr. Joseph Shaw, for the South Kent Water Company; Mr. A. J. Ram, for the Maidstone Rural District Council; and Mr. Pembroke Stephens, Q.C., and Mr. Reginald C. Saunders, for the Mid-Kent Water Company.

According to the opening statement of Mr. Littler, the Cranbrook District Water Company was incorporated in 1895, to construct water-works and to supply water to Cranbrook and certain other places in Kent. The enterprise had been remarkably successful; and but for the late engineering strike, which delayed the delivery of the pumps, the Company would have had their works so far completed that they would now be able to supply the whole of their district. A well 60 feet deep had been bored in the Tunbridge Wells clay; the capacity being 33,000 gallons daily. The Company had also another spring which was estimated to yield no less than 180,000 gallons daily. There was a pumping-main from the wells to a reservoir at Hartley of 200,000 gallons capacity, and at a height of 448 feet above sea-level. So satisfied were the town of Tenterden and a number of parishes in the locality with the resources of the Company, that they were anxious to be supplied by them; and power was therefore taken to extend the limits of supply to Tenterden, Bewenden, Frittenden, Biddenden, High Halden, Rolvenden, Sandhurst, Newenden, Lamberhurst, Horsmonden, Marden, Staplehurst, Woodchurch, Wittersham, and Stone-cum-Ebony in the county of Kent, and Northiam and Beckley in Sussex. The Mid-Kent Company proposed to supply in no fewer than 32 parishes; but the only two parishes which both the Companies wished to secure were Marden and Staplehurst. How the Mid-Kent Company proposed to supply these places, he did not know; seeing that their works were almost on the other side of the county. The more reasonable and proper course seemed to be to authorize the Cranbrook Company to supply the district, which was in their immediate vicinity. The works of the Mid-Kent Company consisted of a well and two reservoirs. One reservoir was 150 feet, and the other 250 feet above sea-level; whereas the Cranbrook Company's reservoir was 448 feet above sea-level. The consequence was that the Mid-Kent Company were seeking a special charge for high services of 25 per cent. extra. The lower reservoir held 250,000 gallons, but was open; whereas the Cranbrook Company's reservoir was covered. The higher reservoir was covered, and held 125,000 gallons. The Mid-Kent Company could pump at the outside 312,000 gallons a day, which would be only sufficient for a population of 10,200 persons. Therefore, in endeavouring to extend their limits, they were doing that for which they would have to make very special provision. True, they were seeking to sink another well; but it was doubtful whether it would yield much more water. They also proposed to build a new reservoir 380 feet above sea-level. But it would be 68 feet lower than the Cranbrook Company's; and seeing that the pipes would have to be so long to reach the district of supply, much of the advantage of the height would be lost by friction. Having regard to all these circumstances, there could be little doubt as to which of the two schemes was preferable for the public. The first petition Counsel dealt with was that of the South Kent Company—a little concern which, although it had parliamentary powers, did not and could not supply. The Cranbrook Company proposed to step into their shoes, and to supply in the whole of their district. Practically the South Kent Company only supplied water to the Paddock Wood Railway. They had a brick well (a mile and a half from Paddock Wood Station) a few feet deep, with a borehole lined with iron running down 90 feet. But the well being within a few miles of the Medway, there could be no doubt that the water came from the river. They had a settling-tank holding a few

thousand gallons, which had been used apparently for extracting iron from the water—iron existing in the water to an enormous extent. The engine-house was about 10 feet square, and contained a vertical boiler supplying steam for a pump of 4-horse power, capable of throwing 16 gallons a minute. In summer, the well usually ran dry after a few hours' pumping. The Company had been in existence since 1889; but no steps had been taken to supply water anywhere except at Paddock Wood. The whole supply, if pumping could be continuous—which it could not—would be insufficient for 3000 people. The authorized capital of the Company was £52,000; but according to the last issued balance-sheet (to December, 1893), they had only been able to get £2446 from the public. The outlay on works had been £260; while their Act cost £2000. They had spent £3068, for which they could only show the £260 worth of works. This was the Company who objected to the present Bill, on the ground that, though they had not supplied water in their limits, they certainly intended to do so. But how they were going to do it, looking to their financial position, Counsel could not understand. The next petition was that of the Mid-Kent Company, who were promoting a Bill which competed with the present measure in regard to the two parishes of Marden and Staplehurst. They urged that they could supply these places at lower rates than the Cranbrook Company; but they concealed the fact that for more than half the district they would have to add 25 per cent. for high service. Then they said the sources of supply of the Cranbrook Company were objectionable and insufficient—which was absolutely without foundation. The petition of the Maidstone Rural District Council also related to the parishes of Marden and Staplehurst, which respectively contained an area of 7607 acres and 5737 acres, and a population of 2350 and 1920. Powers of supply were given the Cranbrook Company under their Act of 1895, the petition stated; but no water had, as a matter of fact, yet been supplied. Water could be found near Marden, which could be supplied at 3 per cent. per annum on the rateable value to the houses; and as the Company could not give the supply at less than 7 per cent. on the rateable value, the Council objected to the inclusion of the district in the Company's area. Portions of Staplehurst were undoubtedly at present inadequately supplied. But the petitioners were taking steps to remedy this; and if the Company could supply this part of the district at the same price as the Council, they would welcome such supply. In face of this, Counsel said, the evidence would show that the Parish Council of Staplehurst were urgently desiring that the Company might get their Bill, and thus be able to supply good and abundant water at a moderate cost. The petitioners further alleged that the sole object of the Bill was to enable them to obtain further capital with which to carry out their original scheme of 1895. This, Counsel asserted in conclusion, was a statement absolutely devoid of foundation.

Mr. E. P. Seaton, the Engineer to the Company, said he was Engineer to the Paddock Wood Railway. While engaged on the latter work, he found the district had a very bad water supply. He made an investigation, as a result of which a reservoir was built at Hartley, the highest place in the neighbourhood, and a well sunk at Soaper's Lane, Hawkhurst, which well had a proved yield of 180,000 gallons per 24 hours. The pumps were capable of drawing 12,500 gallons an hour. The Company had power also (which had not yet been exercised) to construct another well at Hawkhurst. At Goudhurst a well had been sunk in the Ashdown sand, the absolute capacity of which had not been tested, because the pumps were not sufficiently powerful. The minimum yield, however, was estimated at 500,000 gallons per 24 hours. The works proposed under the Bill included another well near Tenterden, where a trial hole had been sunk to a depth of 77 feet, with the result that the water rose a foot above the tube that was put in; a reservoir near the present one at Hartley; a main from Goudhurst well to Hartley reservoir; and a number of other mains, &c. The places proposed to be included in the Cranbrook Company's district had a population in 1891 of 22,718; a rateable value of £18,816; and an area of 88,000 acres. The population of the district which the Mid-Kent Company sought now to include in their area was about 41,000. The works proposed in the Cranbrook Bill were estimated to cost £28,048, including the purchase of land. But the capital sought was £36,000; the balance being for service-pipes and supply-mains for the next few years. Witness went on to give a description of the works of the South Kent Company. Their water, he said, was most impure, and quite unfit for drinking. The two small reservoirs which they had were about 12 yards square, and had no doubt been used to pump the water into, so as to allow the oxide of iron which was present in large quantities to settle before it was distributed. The water was only used for supplying the Paddock Wood Railway and one or two cottages. The Mid-Kent Company's works consisted of a well with a 15-inch borehole. They had duplicate pumps and engines and good water; but they were now supplying as much as they could. They had also two reservoirs which, though they could supply Marden and Staplehurst by gravitation, could not furnish water to Horsmonden, Goudhurst, or Hawkhurst. Their pumping-well was by their well at Halling; and they had very good works, which, however, were not sufficiently large to supply the area they were now proposing to take. Another well was being sunk within 50 yards of the existing one; but it was very doubtful if it would yield much water in addition to the present well. They were pumping about 300,000 gallons a day, of which 40,000 gallons were being supplied to Maidstone. At 30 gallons a head a day, the supply of 300,000 gallons would be sufficient for only about 10,000 persons; whereas they sought power to supply a population of 42,000. The site of the Mid-Kent Company's new reservoir was in an old disused chalk-pit (380 feet above sea-level), which was 20 miles from Marden and Staplehurst; whereas the Hartley reservoir of the Cranbrook Company was only 8 miles from these places. A large amount of the head of water would be overcome by friction in travelling this 20 miles. The Mid-Kent Company asked for an additional 25 per cent. on their authorized charges in case of high service, which would bring their rates considerably above those of the Cranbrook Company, who made no distinction between high and low service.

Mr. Ram briefly cross-examining, witness said the Maidstone Rural District Council knew water was wanted for Marden and Staplehurst; but they desired to have the water of the Mid-Kent Company there. In reply to Mr. Pembroke Stephens, witness said the Company would be able to supply Tenterden within six months, and Staplehurst within a year. The Mid-Kent Company were pumping all the water from their well that could be got. In cross examination by Mr. Shaw, witness admitted that in some cases the charges of the South Kent Company were lower than those of the Cranbrook Company. There was a farmhouse with a cesspool near the well at Goudhurst; but no contamination could get to the well, because it was lined with iron cylinders. It was physically impossible that surface contamination could find its way to the borehole at Goudhurst.

A number of other witnesses were called for the promoters, including Mr. Gerald Perryn, the Resident Engineer to the Company; Mr. Otto Hehner, the Public Analyst; Mr. C. E. Hawkins, a member of the staff of the Government Geological Survey; Dr. Tew, Medical Officer of Health for the West-Kent Combined Sanitary District; Mr. Charles D. Merton, Solicitor to the Company; Mr. Joseph Mace, Town Clerk of Tenterden, and Clerk to the Tenterden Rural District Council; and Mr. A. E. Nunn, the Contractor who carried out the works of the Cranbrook Company. Their evidence went to show that the Mid-Kent Company were quite unable to supply anything like the populations they proposed—viz., their own and that of the Mid-Kent district—their resources being only 312,000 gallons daily; whereas at 30 gallons a head, they would need 2,440,000 gallons a day, or, at 20 gallons a head, two-thirds of this quantity. The water from the two wells of the Cranbrook Company had been analyzed; the water from the Hawkhurst well being shown to be exceptionally pure, while that of the Goudhurst well, though not so good, having a trace of iron, was in every way suited for domestic purposes. As to the possible contamination from surface water of the Goudhurst well, Mr. Hawkins expressed the opinion that the impervious strata of clay lying between the surface and the bottom of the well would effectually prevent it; and regarding the well at Halling, and the one which it was contemplated to sink within 100 yards of it, he thought one would certainly pump against the other. The water supplies of the parishes proposed to be included were generally in a most unsatisfactory condition; illness having been traced to this cause. The workhouse at Tenterden was entirely dependent on shallow wells, which in the summer ran dry. The borough of Tenterden itself was also dependent on shallow wells. Both the Tenterden Authorities had passed resolutions in favour of the Cranbrook Bill. Dr. Tew said the South Kent Company's water was absolutely unfit for consumption. The only reason the Maidstone Rural District Council desired the Mid-Kent Company's water, rather than that of the Cranbrook Company for Marden and Staplehurst, was that the terms were better. The rates of the Cranbrook Company were 10s. per cent. higher than those of the Mid-Kent Company; but the latter had power to charge 25 per cent. extra for high services. Mr. Nunn stated that in constructing the Goudhurst well he used cement segments fitting into one another; cement being then placed at the joints, so that the concrete all the way down virtually became solid, and thus obviated the chance of contamination. The Cranbrook Company would be able to supply Tenterden in six months, and Marden and Staplehurst in twelve.

The case for the South Kent Company was then proceeded with; Mr. Edward Easton being the first witness called. He said he was Chairman of the Company, which was formed in 1889, and had carried out several water schemes in this part of the country. He sketched the history of the Company, and gave an account of the attempts they had made to secure water, none of which, however, had been successful. The other Directors had resigned; and he had therefore put three clerks on the Board—witness then becoming practically the Company. In 1895, he agreed to give up Goudhurst, Cranbrook, and Hawkhurst to the Cranbrook Company; but when they proposed to swallow him up entirely, he approached the Mid-Kent Company, who had agreed to supply him with water for the whole of the South Kent district at so much per 1000 gallons. As a matter of fact, the pipes were now ordered; and he could commence supplying in four months. He had a practically inexhaustible supply; and, as far as he could see, as much capital as was wanted. The South Kent Company's rates were much lower than those of the Cranbrook Company. They were going to construct a reservoir at Pembery, whence the water would be delivered to the whole of the present authorized district by gravitation.

In cross-examination, witness admitted that under his Act, if he did not provide a supply within seven years, the restriction on any of the Local Authorities not to construct water-works was removed; but he held that he should still have the legal right to lay competing pipes. His last balance-sheet was issued in 1893; and he knew that he was liable to a penalty of £20 a day for not having issued one every year since. He admitted that the Company had practically supplied no water. Witness produced the agreement (which was in perpetuity) with the Mid-Kent Company, under which the latter Company were to supply the South Kent Company with all the water they required—the first 10 million gallons per annum at 6d. per 1000 gallons, and succeeding quantities at 5d. If the South Kent Company were in default in paying for the water, or were to break any other clause, the Mid-Kent Company had power to cut off the supply without notice. The South Kent Company also undertook to construct reservoirs for storage. It was suggested to witness that he had no power now to construct works; but while admitting that the Company's compulsory powers had expired, he held that they still had their general powers. To carry out the agreement with the Company, which was dated the latter end of April last, £40,000 or £50,000 would be needed. He had now got £10,000 of the capital subscribed; £5000 having come from Lord Wandsworth, and £4500 from another gentleman. With this money, a banking account was opened the day the agreement was signed. Witness signed the agreement as Secretary *pro tem.* He was now Chairman of the Company; and two Directors of the Mid-Kent Company were to come on the Board to look after their own trusts. Questioned by the Chairman as to why he had not gone to the Mid-Kent Company sooner, witness said he had not had an opportunity. He estimated that the South Kent district would require about 500,000 gallons a day.

Mr. Shaw having addressed the Committee, the petition of the Maidstone Rural District Council was proceeded with; Mr. L. Fletcher, Chairman of the Council, being called. He gave the reasons why the Council preferred the Mid-Kent Company's supply to that of the South Kent Company; the only one which had not already been stated being that the former Company proposed to furnish water to a number of other parishes besides Marden and Staplehurst, and the Council would rather have all the parishes supplied by one Company.

The Chairman interposed at this point, and said that, without deciding

which Company were to have power to supply in Marden and Staplehurst, the Committee at present thought the Cranbrook Water Company should not have it. The Committee, however, were of opinion that the Cranbrook Company should have power to supply in the extra districts they had scheduled. The time within which the supply must be made would be reduced from the period stated in the Bill to eighteen months.

Mr. Saunders then claimed to be heard generally in opposition to the preamble of the Cranbrook Bill. He said he had a large body of evidence which would demonstrate that the Cranbrook Company's water was impure. Counsel for the Cranbrook Company contended that the Mid-Kent Company had no right to be heard now; seeing that all that had been in dispute between the two Companies was as to who should supply Marden and Staplehurst, which matter had been decided against the Cranbrook Company. A long argument ensued, which, in the end, was referred to Mr. Chandos Leigh, the Speaker's Counsel, who, after having the facts explained to him, decided that the Mid-Kent Company had no *locus standi* to be heard against the preamble.

The clauses of the Bill were then gone through and adjusted; and the Bill passed the Committee.

LEGAL INTELLIGENCE.

PRESCOT PETTY SESSIONS.—Tuesday, July 19.

(*Before Messrs.* J. Stone, W. Lee Pilkington, *and* J. Berry.)

The Liverpool Corporation Fined for Deficient Water Supply.

To-day an adjourned summons, taken out at the instance of Mr. Harry Mercer, the Hon. Secretary of the Prescot Conservative Club, against the Liverpool Corporation, for having, between the 1st of February and the 10th of May neglected to furnish him with a sufficient supply of water, as required by the Liverpool Water-Works Act, 1847, came on for hearing.

Mr. Collingwood Hope appeared for the complainant; Mr. T. Swift represented the defendants.

Mr. Swift explained that the case had been already twice adjourned. At the time the adjournments were asked for and obtained, there were a number of appeals going on. Since then, however, the Corporation had passed a resolution to the effect that the Water Engineer be instructed to lay a special main for Prescot of a sufficient size to supply the houses about which the complaint had been made. The Corporation were fully determined to comply with every possible obligation under their Acts of Parliament, and to lay down the necessary pipes and execute the works required in order to give to the town of Prescot and its inhabitants a full and adequate supply. Then, again, it was resolved by the Corporation—"That the Town Clerk withdraw the notices of appeal, and abandon the special cases granted by the Justices." The Corporation submitted entirely to what this Court and Quarter Sessions had decided. Since the resolution had been passed, the Engineer had entered upon the work. It would take some time to get the pipes down; but they expected to be finished in about three weeks' time. Therefore, he asked their Worships that the case might be further adjourned for a month, in order to see whether or not the Corporation would carry out their intentions.

Mr. Hope said that, having regard to the past history of these transactions, the application for an adjournment was not dignified on the part of the Corporation; and he objected to any such thing. Nearly eighteen months ago the Corporation had the case of Brady started against them, and they were convicted in this Court. An appeal was taken to the Divisional Court last year, and decided against them. They were not satisfied with this, but disputed the decision right up to last month. The case for the complainant was that on various dates between the 1st of February and the 10th of May, although during the daytime, more or less frequently, there was water going into the cistern, at other times, when the ordinary supply was being drawn upon by other consumers, there was no water entering the Conservative Club at all. Hence the summons taken out for an infringement of the Act, which declared that the supply of water should be sufficient for domestic purposes. He asked for a penalty for each of the 99 days during which time the offence had been in progress.

The Chairman said the Bench were satisfied the case must go on.

Mr. Hope then called Mr. Mercer and the Club Manager, who corroborated the statement as to the inefficiency of the water supply.

Mr. Swift, in cross-examination, strove to elicit an admission that the supply, as a whole, was adequate.

This led to a sharp exchange between Counsel.

Mr. Swift, in his defence, contended that, on the evidence, there had been no proof that the supply of water was insufficient for domestic purposes; and consequently no case had been made out.

The Chairman, after retiring with his colleagues, decided that the complainant's case had been made out, and that there had not been a constant supply of water. The defendants would be fined the full amount—£10 for one day and £2 for each of the 98 days on which the offence was repeated. They must also pay £10 costs; making £216 in all.

Five other cases of a similar nature were, by agreement, adjourned.

Interruption of Water Supply—Consumers' Right to Notice.

An action was brought at the Honiton County Court on the 14th inst. to recover damages against the Honiton Town Council for turning off the supply of water without notice. The plaintiff, James Creedy, alleged that the water was turned off several times without notice; and on one occasion, in particular, he was 60 or 70 hours without water—thus being compelled to fetch his supply from some distance. He was informed that the water was then turned off because the reservoir was being cleaned out; but he was given no notice of this. In answer to his Honour Judge Beresford, plaintiff said he understood that 100 notices were posted; but none were sent into his district. His Honour remarked that the Town Council were bound to do their best not to cause inconvenience; but it did not follow that they must post notices on every door in the neighbourhood. He non-suited the plaintiff.

MISCELLANEOUS NEWS.

EUROPEAN GAS COMPANY, LIMITED.

The Annual Meeting of this Company was held on Monday last week at the London Offices, Finsbury House, Blomfield Street, E.C.—Mr. John Blacket Gill in the chair.

The Secretary (Mr. W. Williams) read the notice convening the meeting, and also the following report of the Directors:—

The business of the Company has made satisfactory progress during the past twelve months; and the Directors are pleased to report, that, with the exception of Bolbec, where the consumption has been stationary, there has been a general increase in the sale of gas at the Company's stations. The increase was, in the aggregate, 4½ per cent., and has again been greatest at Havre, where it amounted to 7 per cent.

Coals have cost less than during the preceding year; and both coke and sulphate have yielded improved returns. The revenue from tar has been practically unchanged.

In accordance with the policy mentioned in the last report, the Directors have sold some further land at Boulogne, not required for the Company's business.

The lawsuit between the Company and the town of Bolbec on the question of public lighting came before the first Court in February last, when, unfortunately, the decision was unfavourable to the Company. The Directors have, however, appealed against this decision, and hope to be more successful in the next Court.

Pursuant to the terms of the treaty made with the town of Nantes in 1886, when the Company's concession, which would have expired in 1906, was extended for a further period of twenty years, the Board had, last year, to increase the allowance paid to the town. This additional charge, together with the heavy expenses in connection with the large number of prepayment meters and fittings on hire placed at the various stations during the year, has absorbed the extra profit resulting from improved business. The Directors are, however, able to recommend the payment of the usual dividend—viz., 20s. per share on the fully-paid shares, and 15s. per share on those £7 10s. paid, less the interim dividend of 8s. and 6s. per share respectively paid on the 1st of February last; also the payment of a special bonus of 1 per cent. on all shares, according to the amount paid thereon. A balance of £1488 will remain to be added to the reserve of undivided profits.

Notice has been given that two Directors (E. F. White, Esq., and N. E. B. Garey, Esq.) and both Auditors (J. Reeson, Esq., and F. M. Fry, Esq.) retire from office at this meeting; but, all being eligible, they offer themselves for re-election.

The Chairman said he thought the report which had been read would be regarded by all the shareholders as very satisfactory. As they had heard, there had been an increase of 4½ per cent. in the rental, which was somewhat better than last year. Though it was not a large sum, still when they remembered the enormous amount of competition they had to meet in every town, he considered it was very gratifying that they were able not only to maintain their position, but to improve it. The increased profit had been distributed in this way: according to their receipts at Havre, the Company had to make a certain allowance to the Municipality; and this time they had to give them £800 extra. Then again, at Nantes, the Company were under agreement, for the lengthened concession they obtained some years ago, to give the Municipality an additional allowance which represented £2000 a year. These items, together with £5000 which had been spent on fittings for the prepayment system and depreciation, had to be set against the £9000 increased rental. But it was a matter for considerable congratulation when they reflected that they were able to use a large portion of the increase of rental in so excellent a fashion that it was being employed, in the shape of coin meters, in extending their business. As the shareholders were aware, the Bolbec lawsuit had not terminated. It would be remembered that he alluded to this at the previous meeting. It was really only a small matter; but there was a principle involved in it. Therefore the Directors felt it was their duty to carry it to a higher Court, and have the question properly settled. He understood the law's delays in France were much the same as in this country; so that probably the shareholders might meet again before they were able to learn the result. The report also alluded to the selling of a small portion of the Company's land at Boulogne. As many of the shareholders were aware, some years ago the French Government imagined that Boulogne was to be a great seaport, and expended large sums of money upon the harbour. The Company thought they would follow suit; and the Directors at that time spent more than subsequent events had shown was absolutely necessary upon increasing the gas-works. Now, however, they watched for, and took advantage of, every opportunity of selling a portion of the land that was not useful. They were about to put up a new gasholder at Havre. For some time they had been suffering from shortness of storage there; and, acting on the advice of an eminent London Engineer, they had obtained plans for a holder, and had just settled a contract for its construction. It might interest the shareholders to learn that this holder, which would make a great hole in £10,000, could have been put up in England considerably cheaper. Although labour was dearer in this country than in France, there was a heavy amount to be paid in the way of protective dues. They would have to pay more than £1000 dues on the steel and cast iron they had to export. More than this, they were going to construct the holder with only two lifts, for which they would have to pay a tax of about £240 per annum to the French Government; while if they had built the holder in four lifts, the tax would have been just double. This showed that gasholder building in France was an expensive luxury. The coin meter business progressed very favourably. They had no less than 202 of these meters at Bolbec, 286 at Boulogne, 1514 at Havre, and 2530 at Rouen; making a grand total of 4514. They had not unduly pressed these meters. In the several towns they supplied, they had shops where all sorts of gas appliances were exhibited; and he presumed that many of the working people had seen them there, with the consequence that there was a large increase in the number of these meters placed. They were doing an important business in this direction; and would do even better in the future than in the past. As to the amount put down for depreciation of works, their concessions had an average of about 25 years to run. The Directors were making efforts to extend their concession at Amiens, as they were desirous of reducing the price of gas supplied in that city. As the

shareholders would understand, the Directors were prepared to lower the price; but they wanted to get a *quid pro quo*. They therefore hoped that eventually they would have a longer concession for Amiens by supplying gas at a reduced rate. The same remarks applied to Boulogne; and they were endeavouring to obtain a longer concession there. He (the Chairman) was sorry to inform the shareholders that they had the misfortune to lose their Engineer at Nantes (M. Perthuis) last November. He was a young man of considerable promise. He was formerly Assistant Engineer at Nantes; but on M. Gautier's promotion to Havre, the Directors were glad to advance him to the position of Manager at Nantes. He would have been a good servant; but unfortunately he died from lung disease shortly after his promotion, much to the regret of the Directors. Coal had risen considerably this year; and they had to pay a good deal more than before. The South Wales strike had so pressed the northern collieries that they were charging very much more now than they were this time last year. It was, however, absolutely essential that the Company should make their contracts, and so they had been obliged to pay a higher figure. But when coal was high in price, they obtained some sort of compensation in coke; and he hoped it would be the same this year. Anyway the Board would strain every nerve to make both ends meet next year. The Company were in a strong position. They had now about 50,000 gas-stoves on hire, which was very satisfactory; and 350 gas-engines. The number of consumers had increased by 2849; so that they had a total of nearly 40,000. Many of the new consumers were, no doubt, coin meter ones. As to the residuals, coke had produced £47,783, which was an increase of £731. Tar had yielded very much the same—£8000; while sulphate of ammonia showed an increase of more than £500. He was glad to say there was a chance of the sulphate of ammonia market improving. Their bad debts for the year amounted to £588; and he thought the shareholders would agree that, with a rental of £250,000, this was very satisfactory, and proved that the collectors looked well after their business. The Company were able to declare the same dividend as last year—10 per cent., and a bonus of 1 per cent.—and to carry forward £1488. The investments had not been very largely added to. They stood at a good round sum, where he trusted they would continue to stand for many years to come. Some of the shareholders might have noticed that the price of the Company's shares had somewhat diminished lately; but he believed this applied to most Continental companies. It arose simply from the rise and fall of the political barometer; and if things went on happily in France, they would soon find that the price of the shares would rise again. He concluded by moving the adoption of the report and accounts.

Mr. N. E. B. Garey seconded the motion, which was unanimously carried.

The dividend and bonus recommended in the report having been declared,

The Chairman proposed, and Mr. E. T. E. Besley, Q.C., seconded, the re-election of the retiring Directors (Messrs. E. F. White and N. E. B. Garey); and afterwards, on the motion of Mr. H. E. Jones, seconded by Mr. R. S. Gardiner, the retiring Auditors (Messrs. Joseph Reeson and F. M. Fry) were also re-appointed.

The usual complimentary votes were passed to the Chairman and Directors, as well as to the officers at home and abroad; and the proceedings terminated.

DEVONPORT GAS COMPANY.

The Fifty-fourth Annual Meeting of this Company was held last Thursday—Mr. R. C. Smith in the chair.

The Secretary (Mr. J. Williams) having read the notice convening the meeting, the report of the Directors was presented. They stated that while the sales of gas for public and private lighting showed an increase of 3½ per cent., there had been a falling off in the consumption of gas recorded in the Government departments to the extent of 5 per cent., partly due to the closing of Raglan Barracks. The total amount received for gas was £23,646, compared with £23,350 in the preceding year. Residuals showed a marked improvement; the total amount realized being £6277, compared with £5266 in 1897. The revenue for the financial year ending May 31 was £30,768, compared with £29,435 before. The expenditure amounted to £26,132; leaving a balance of £4636, which was carried to the credit of the profit and loss account. After payment of the dividends declared and authorized at the last general meeting, together with the interest on debentures, there remained a balance of £9565, from which the Directors recommended payment of the statutory dividends of 10 per cent. on the original, and 6 per cent. on the guaranteed shares. The upward movement in the price of gas coals, noted last year, had been accentuated by a further rise during the year reported upon. Happily the Directors concluded their contracts for the annual supply before the late advance was reached. The reconstruction of two of the retort-houses was being proceeded with; and it was expected that the work would be well advanced, and the whole of the benches reset on the regenerative principle by the end of the current year.

The Chairman, in moving the adoption of the report, commented upon the increase in the price of gas coal, which was now, he said, from 15 to 20 per cent. dearer than it was a couple of years ago. The property of the Company was re-assessed last year, and the value was increased from £3000 gross and £2250 net to £6646 gross and £4800 net. The Directors appealed against the new assessment, which was ultimately reduced to about £1000 in advance of the old amount. The small increase in the sale of gas was partly accounted for by the closing of Raglan Barracks, and partly by the fact that about 60 per cent. of the new houses erected the last few years did not have a supply of gas. This fact had led the Directors to enter into an arrangement with Messrs. Willey and Co., of Exeter, to fit up all new houses with pipes, meters, and stoves, so that a tenant upon going into possession would not have to provide gas-fittings. The gas would be carried into the houses and the fittings supplied entirely free of charge to the owner or occupier; the gas consumed being paid for on the slot system at the rate of 1d. for every 22 feet, compared with 3d. for every 100 cubic feet as at present. The system had been found of great advantage in several large towns; and he believed it would be acceptable in Devonport. There had been an increased expenditure in nearly every item, with the one notable exception of rents, rates, and taxes. The new assessment had not come into operation; and the Company had ceased to pay conventionary or ground rent—the property being now freehold. In conclusion, he referred to the scheme which is before Parliament for the enlargement of the boundary of Devonport, and condemned it.

Mr. G. Hawken seconded the motion.

Mr. W. J. Moon, while congratulating the Directors upon adopting the system of supplying pennyworths of gas, asked whether it would be extended to houses which already had gas laid on.

The Chairman said at present the Directors were not prepared to fit up cooking-stoves to every house which had a supply of gas. They were simply prepared to fix the pipes and fittings to small houses recently built, and they did not at present contemplate carrying out the system generally. The shareholders would derive no pecuniary advantage from the supply of "penny-in-the-slot" meters, because the Company were limited in the amount of their dividend, which was at its maximum. It was a mere question of *pro bono publico*.

The report was adopted, the dividends recommended were declared, and the retiring Directors re-elected.

Mr. R. H. Rae proposed—"That, in consideration of the valuable services rendered to the Company by Mr. A. Bennee, as Managing Director, the amount allowed as fees to the Directors be increased by £100 a year, that Mr. Bennee may be more adequately remunerated for his services."

Mr. W. Ford seconded the proposition, which was carried unanimously, and acknowledged by Mr. Bennee.

The Directors and officials were then thanked for their services; and the proceedings closed.

THE GAS QUESTION IN VIENNA.

The Municipality's Dispute with the Imperial Continental Gas Association. Victory of the Association.

Telegraphing last Friday, the Vienna Correspondent of the "Daily News" said: "Dr. Lueger, the anti-Semitic Mayor, has suffered a terrible defeat in the enormous undertaking upon which he entered with so light a heart. After his election, he loudly proclaimed his intention to get rid of the English owners of the Vienna Gas-Works. The contract of the Company ends in October, 1899, and Dr. Lueger offered 16,500,000 fls. for the works and street-lamps. The Company, anxious, no doubt, to come to an amicable arrangement, after some delay accepted; but the Mayor then declared it was too late. He had already ordered new pipes, and he would not hear of an arrangement. His experts declared that a capital of 22,500,000 fls. would cover all the cost; and Dr. Lueger set about laying his pipes and building his new works. It was his conviction that the incorporation of the suburbs in Greater Vienna legally annulled the contracts of the English Company with those suburbs, all of which contracts were made for longer periods than the one with the City proper, and some of which run until 1918 and 1920. On the 1st of April, the sum already spent upon the works exceeded 25,000,000 fls.; and experts declare now that 36,000,000 fls. is the very least they will cost. This is bad enough; but yesterday the High Court of Justice for the second time found in favour of the English Company; and the Municipality will not only have to give up the idea of providing the suburbs with gas, but it will find it almost impossible to approach its own works with the pipes that are to supply Vienna proper, since the Company has the exclusive right of laying pipes in the suburbs. The consumption of these 26 suburbs amounts to three-tenths of all the gas consumed in Vienna. It must be, moreover, remembered that Vienna has spent these enormous sums at a time when electric lighting is taking the place of gas very rapidly. When Dr. Lueger has done laying gas-pipes all over Vienna—the misery of which undertaking to the population is beyond description—the English Company will begin taking their pipes out. In the meantime, the streets are paved worse than village roads, because the Municipality is leaving the final paving to the Company."

THE SWANSEA CORPORATION AND THE GAS COMPANY.

The Appeal Abandoned.

In the last number of the "Journal" it was stated that the General Purposes Committee of the Swansea Corporation had authorized a Sub-Committee to proceed with the appeal against the decision of Mr. Justice North in the matter of the application of the Gas Company for an injunction to restrain the Corporation from expending the borough funds in opposing the Company's Bill without the consent of the ratepayers. When the minutes of the Committee came before the Town Council last Wednesday, Mr. Martin drew attention to the one bearing upon this matter. He pointed out that the appeal would be expensive, and remarked that, inasmuch as it was a matter to benefit the municipal authorities of the country at large, he thought they should get the Municipal Corporations' Association to take steps to have the law amended. It would be a far better and more practical way than to appeal against the decision of one of Her Majesty's Judges. The Mayor (Mr. J. Aaron Thomas) mentioned that the opinion of Counsel had been received; but as he (the Mayor) had said before, the point was a moot one. He hoped no one would think he wanted to unduly press the appeal. There was a great deal in what Mr. Martin had said. They were really making law for the country. If the Council were in any way divided by a large section, he personally did not wish to press the appeal. Mr. Martin moved the elimination of the minute; and Mr. Sinclair seconded the motion. It was stated that the Chairman of the Committee was prepared to accept the resolution. The Mayor deprecated discussion on the matter, because, if they were going on with the appeal, anything they might say might be used against them. He had the personal opinion of the Town Clerk; and he (the Mayor) should like the Council to know what it was. But he did not think it should be published, as it was, after all, only an opinion. Alderman Viner Leeder suggested that the Council should consider the matter privately in Committee. Before they voted money for the appeal, he said, members should all have the knowledge which the Sub-Committee possessed. Alderman G. Morgan thought the matter should go back to the Sub-Committee. Eventually, the minutes, amended by the omission of the one relating to the appeal, were passed.

THE BENIGHTED POLICY OF LIGHTING AUTHORITIES.

The current number of "London" contains an article on the above subject in which some well-directed remarks are made in regard to the public lighting of the Metropolis. Our contemporary says:—

London, we regret to say, continues to keep its unenviable position as the worst lighted of all large cities. Here and there electric arc lamps throw off a blaze of light, and at some corners big gas-lamps have been erected; but many of our chief central thoroughfares and almost all the small streets remain with only dim flickering lights distributed by means of obsolete lamps. Such an important thoroughfare as the Strand, for instance, depends mainly for its light, not so much upon its antiquated lamps as on borrowed light from shops, public bars, and theatres. No authority has yet set a good example of street lighting in London, if we except one or two little bits of electric lighting, and these are not by any means perfect. Parliament and the County Council are among the chief offenders. The lamps round Palace Yard and Parliament Square are picturesque, but not successful as a means of illumination. Recently the Office of Works decided to improve them by using incandescent burners. But the lanterns were so dilapidated that they would not be adapted; and rather than alter the lanterns, the authorities left Parliament Square as it is. The County Council are responsible for the lighting of the Thames Embankment and the parapets of the bridges; but although many schemes have been proposed, the public have not yet reaped the benefit. An effort is now being made to disfigure Waterloo Bridge by establishing electric light. The old dignified gas-lamp standards are allowed to remain, and alongside these are set up thin, insignificant standards entirely out of harmony with the others and the character of the bridge. Either new standards of a style in harmony with the architecture of the bridge should have been used, or the old ones adapted.

The local authorities, of course, are the greatest offenders. They make no effort to improve the light except in a fitful sort of way; and even when one district shows enterprise, its neighbour lags behind. This is illustrated in Kensington, which has adopted very largely, and with good effect, incandescent gas-lights. But one side of a main road which is in Kensington is well lighted, while the other side, which is in Westminster, has still to put up with the old-fashioned lamps and burners. It cannot be said that this desire to maintain a bad lighting system is prompted by economy. Some of the districts have a fancy for electric light lamps, which, we admit, are expensive; but no better light can be found for street purposes than the new incandescent lamps, and it actually becomes cheaper than the present system. Some attempts which have been made to establish incandescent lamps in the London streets have not been very successful owing to the short-sighted policy of the Vestries. Incandescent lamp-burners, to give the best effect, ought to be put in good lanterns; but the Vestries expect to get the good result from this new method without going to the expense of giving it a proper installation. We frequently see attempts being made to fix up new incandescent burners in old-fashioned lanterns tacked on to standards which have lost the perpendicular. Under such circumstances, good results are impossible; and the Incandescent Gaslight Company has too much regard for its own reputation to help authorities to light in this half-hearted way. As a matter of fact, however, if the Vestries would go to the trouble of spending 15s. on new lanterns, which would improve the appearance of the streets, besides improving the illuminating power of the lamps, it would be found that the extra cost would soon be equalized by the economy of using incandescent burners. This is well illustrated in Liverpool, where the principal streets are lighted with incandescent lamps, although the Corporation own the electric lighting supply. The important thoroughfare of Lime Street is lighted with incandescent lamps at a saving of over £500 a year; while no better lighting could be desired. The burners were put in special lanterns which did them justice; and by good management, it was found that the average annual renewals were only two mantles and two chimneys—the total cost amounting to 3s. 11d. a year, which was equal to a reduction of 75 per cent. on the maintenance charges as compared with the former lamps. It is here where the economy comes in, and not in begrudging a good lantern to start with.

The Greater London authorities are more alive to improved gas lighting than most of the London authorities. Croydon, Tottenham, Twickenham, Willesden, Acton, and Barnes have all adopted incandescent gas lighting for their streets, and are extending it. The system is making enormous strides in the Provinces; and almost every large town, including Liverpool, Manchester, Bradford, Ipswich, and Preston, is using it in some of its streets, while it has gained great popularity at seaside resorts. Sheffield has adopted it, and is putting two burners to each lamp, which will make it the best-lighted city in the country. Sheffield, again, owns its electric lighting, but finds that incandescent gas is cheaper, and, by distributing the light more equally, is preferable.

HUDDERSFIELD CORPORATION GAS SUPPLY.

A Comparison of the Working with that of other Undertakings.

The Huddersfield County Borough Council, at their Meeting last Wednesday, had before them the following motion, of which notice had been given by Mr. Barras: "That the Gas Committee be requested to furnish this Council at the next meeting with further details of their last year's expenditure and income account, showing amount of gas made, sold, and used at the works, leakage of gas, and net cost of same per 1000 cubic feet, also the average price of coal and oil used per ton."

Mr. Barras, in proposing the adoption of his motion, said it was no mere idle curiosity which prompted him to endeavour to learn why the profits from the gas undertaking were so much less in comparison with certain other towns. When they considered the large amount of money that had been spent upon the gas plant, and the high price charged for gas for lighting purposes, certainly they ought to expect as good results in regard to the production of gas and profits as was obtained by other undertakings. But he was afraid, from information before him, that they did not. The Corporation could buy coal as cheap as other towns; and the fact of getting 2s. 9d. per 1000 cubic feet of gas should help to make the profits better than at present. But he feared that, even with these advantages, they were behind the times, especially as to the production of gas per ton of coal carbonized. In their own case, it was 10,095 cubic feet; while at Halifax it was 10,313 feet, at Bradford 10,475 feet, at Leeds 10,337 feet, and at Cleckheaton 10,835 feet. Besides this comparatively low production, the amount of gas unaccounted for must be enormous. Then in the past year, they had carbonized 55,209 tons of coal, costing £21,786, and 374 tons of oil, costing £1533; making a total of £23,319. This ought, even at the low rate of production of 10,095 cubic feet per ton, to produce 557,334,855 cubic feet. The amount of gas sold was 432,510,000 feet, leaving unaccounted for no less than 124,824,885 feet, or nearly 20 per cent. of the total, and this on a small production. This unaccounted-for gas represented, if reckoned at 2s. 9d. per 1000 feet, above £17,000. Halifax in the past year produced from 75,197 tons of coal, costing £27,568, no less than 775,529,000 cubic feet of gas, and sold 709,104,700 feet at the low price of 2s. 2d., less 8½ and 12½ per cent. The leakage was 8·02 per cent. Cleckheaton had produced from 7508 tons of coal 81,349,000 cubic feet of gas, and sold 73,511,000 feet. The cost of coal averaged 8s. 11d. per ton. The leakage of gas was 9·63 per cent.; and the gross profits, £3595—the charge for gas being 2s. 8d., less 10 and 15 per cent. Bradford had made a gross profit, including street lighting, of £65,771, or a net profit of £38,345, reckoning the cost of lighting at over £20,000. The leakage of gas was 4·7 per cent.; and the price was 2s. 3d. and 2s. net. His opinion, from the scanty information at command, was that the production of gas per ton of coal carbonized was much below what it should be; and that the large amount of money spent on the works ought to show much better results. In addition to the few particulars given in the Gas Committee's statement, the Council ought to have specified, for their information, the amount of gas produced and used at the works, the leakage, the leakage per mile of main, and the average cost of the coal carbonized. Besides this, they ought to know the net cost of production and distribution of gas, as he feared it would work out to more than the 2s. per 1000 feet, less 5 per cent., charged for stoves, especially taking into consideration the cost of fixing the stoves, which was now borne by the Gas Committee.

Mr. Beaumont seconded the motion to give the Chairman of the Gas Committee an opportunity of replying to Mr. Barras.

Alderman Stocks (Chairman of the Committee) expressed surprise that Mr. Barras should plead so much ignorance, and ask for these simple questions to be answered, when he was in possession of such an amount of information as he had shown himself to be. Mr. Barras had told him more than he was aware of—that the leakage of gas was over 20 per cent. As a matter of fact, it was not half that. Speaking for himself, he should do no such thing as answer the questions in detail. He objected to Mr. Barras coming to the Council first, and going over the heads of himself, the Gas Engineer, and the Committee.

Mr. Jordan thought the charges brought against the Committee ought to be inquired into.

Alderman Woodhead hoped the mover and seconder would withdraw the motion, and appeal to the Chairman of the Committee for the information required.

Mr. Barras said he made no charge against the Committee, but merely sought for information, the nature of which could be gleaned in other towns, but which the members of the Huddersfield Council could not get from the Gas Committee. He thought he had asked for the information in a proper manner; but if the Council would abide by the result, as he was prepared to do, he would withdraw his motion.

The Council agreed to allow the motion to be withdrawn; and the matter dropped.

A "REVOLUTION" IN GAS PRODUCTION.

Gas Without Coal.

Rumours recently reached us of a new process of gas manufacture which had come to light in the Antipodes, and which, it was claimed, would revolutionize the gas industry. An esteemed correspondent has now sent us the following particulars of the process which appeared in the "Melbourne Age"—curiously enough on the 1st of April. They will doubtless be perused with some interest.

After recent events in Sydney, the public are likely to look askance at inventions claiming to develop a high standard of illumination at a very moderate cost. But a representative of the "Age" has had an opportunity of witnessing the trial of a new patent gas, which promises to revolutionize modern systems of lighting. The inventor is Mr. A. A. Stephenson, and his system has been in daily use for lighting the town of Frankston since November last. Its superiority to coal gas has been amply demonstrated in these practical trials; and its cheapness may be gathered from the fact that the cost of manufacture does not exceed 1s. per 1000 cubic feet.

The apparatus and materials used by Mr. Stephenson for the production of this illuminating fluid are exceedingly simple. He first of all creates a reservoir of air in the ordinary way, by means of a cylinder sunk in water. The atmosphere so stored passes from the air chamber through a carburetter containing a combination of various chemicals. These are all set out in the patent, and were used in the experiment in the following proportions: First of all Mr. Stephenson placed in the carburetter (which is simply an ordinary iron box with taps for conveying air on one side and discharging the gas on the other) a pint of kerosene; then he added about a couple of ounces of powdered resin; next a certain proportion of shale oil, about an ounce of salt, half an ounce of ether, a few drops of bisulphate of carbon, half a gallon of gasoline, a little camphorated chalk; and, finally, a small dose of oil of cloves. Before these articles were placed in the carburetter, that instrument was thoroughly examined by the company present. It was found to be empty, there were no compartments inside, and it was not attached to any fixture except those connected with the apparatus. The ingredients were purchased at a chemist's shop by a gentleman present; and the proportions used by Mr. Stephenson would probably represent a value of 2s. Having placed the various compounds in the carburetter, it was well shaken, the air was turned into it, the tap from which the gas escapes was turned on; and when a match was applied to the burner, a flame similar to that of coal gas, but of greater

brightness, was at once given forth. This is the light that has been in existence at Frankston for the past four or five months; and it has given great satisfaction. The gas can be applied for heating as well as lighting, and may be used for driving power, having been adapted to ordinary gas-engines up to 24-horse power with the same success as ordinary coal gas. The materials used in the trial were sufficient to maintain one light five or six hours a day for a period of six weeks, at the end of which time the carburetter would require re-charging.

In order to obtain a light of still greater brilliancy, Mr. Stephenson has made a further discovery, the practical application of which has been attended by most gratifying results. Using a generator specially made for the purpose, he produced another form of gaseous fluid, the illuminating capacity of which is equal to some 45-candle power. The ingredients used in the manufacture of this gas are a mixture of iron and low carbons (enclosed in linen cartridges 8 or 9 inches long and 1 inch in diameter), unslacked lime, naphthalene balls, and camphor. The lime coming in contact with the water sets up heat, causing the carbons to discharge a gas. That proved to give a light of extraordinary brilliancy; and, despite its power, the consumption of gas is exceedingly small. The best results are obtained from a combination of what, for convenience, we may call the Frankston gas and the new aëriform. They were run into the same burner; and the light was a clear, steady, beautiful flame, dazzling to look at. Mr. Stephenson stated that his gas in the experiment was burning at the rate of only 1 foot an hour, and would in that time give a light equal to 18 feet of coal gas.

The charm of the invention is its simplicity, and the easy, convenient manner in which it may be applied. The two forms of gas made may be produced in the one generator, which occupies comparatively little room; and the air reservoir only takes up a small space. The mixing of the chemicals is a somewhat unpleasant process; but this could be done at central works, and the generators replaced as they were exhausted. All the consumer would have to do would be to keep the air chamber supplied, and that could be done with an ordinary bicycle pump. There is no need for expensive mains or the tearing up of streets; but the ordinary gas-pipes could, of course, be used for supplying small consumers. In large establishments each system would be complete in itself. The present gas installations in houses and shops will convey the new gas in the same manner as the ordinary illuminant—the burners and other appliances being just the same. Mr. Stephenson states that his gas would keep the pipes clean, and the naphthalene deposited by coal gas would tend to improve his light.

If the inventor can maintain in actual working and over a prolonged period the results achieved, then coal gas is doomed. Because, not only can the new gas be produced for 1s. per 1000 cubic feet, but the amount consumed in accomplishing the same result is only about a third of what would have to be used by present methods of lighting. The influence of the invention upon coal mining must also be very great, as the new illuminant can perform all the services discharged by coal gas. Mr. Stephenson's invention is said to be free from every danger of explosion; tests made with the object of determining the explosive quality of the gas having satisfied the insurance companies, who have not hesitated to allow exhibitions of the apparatus in full working order in one of the largest buildings in Queen Street. A Company is being formed to work the patent in Melbourne. The rights have been disposed of in some of the other colonies; and Mr. Stephenson is now under negotiation for the sale of his invention in England.

ELECTRIC LIGHTING NOTES.

A Local Government Board inquiry has been held at Croydon with reference to an application by the Corporation for power to borrow £23,278 for extending the electric light to Norwood. The evidence was of a formal nature, and no opposition was offered by the ratepayers.

An application for power to borrow £26,000 for electric light extensions was the subject of a Local Government Board inquiry at Sunderland a few days since. The Inspector (Mr. G. W. Willcocks) was informed by the Town Clerk that the deficiency on the electric light undertaking for the first year of its existence was £642; and for the second year, £982. But this year they had earned a net profit of about £164.

Now that a little of the novelty has worn off, the people of Exeter are beginning to criticize the electric lighting of the streets. One of the papers pronounces it "a great success," but at the same time expresses the opinion that the standards are too far apart and the lights too high to be effective. In one of the thoroughfares—Fore Street Hill—the residents are complaining, "with too much reason," that the lighting is not so good as it was with gas, and this in spite of the fact that at this season the nights are seldom really dark.

Evidently, the Bradford Corporation Gas and Electricity Committee do not intend being troubled further as to the price paid for the gas supplied by the Shipley Gas Company to the street-lamps in Frizinghall; for, at the meeting of the Council last Tuesday week, on their recommendation, the Electrical Engineer was instructed to proceed with the lighting by electricity of the lamps in that district. It was further decided that a transfer should be made from the Gas Department to the Electricity Department of a sum equal to the amount paid to the Shipley Gas Company for any lamps in which electricity is substituted for gas.

The citizens of Bath appear to have a just cause of complaint against the electric street-lamps, which seem to possess remarkably turbulent spirits. In what should be the still hours of the night, they make such a noise that they prevent Mr. C. B. Oliver obtaining sleep. This gentleman, being a member of the City Council, complained of their vexatious conduct at a meeting of that body last Tuesday; and he even went so far as to appeal to the Chairman of the Electric Lighting Committee (Alderman Taylor) to have the offenders removed from the neighbourhood of his residence. Confirmation of the annoyance was given by his Worship the Mayor (Major C. H. Simpson), who declared that the complaint as to the behaviour of the lamps was very general; many had spoken to him about it, and it was very distressing. Alderman Taylor assured the Council that the lamps were receiving all the care that was possible from the makers, who were constantly saying that, before the lamps were handed over to the Committee, they would make nothing beyond the ordinary noise. The Alderman did not appear prepared to define what was meant by "ordinary noise;" and, further questioned, he stated that to explain the reason for the noise would involve many technicalities. It is to be hoped, however, that he will yet be prevailed upon to enlighten his colleagues on the point.

Mr. H. Boulnois visited Bury St. Edmunds last Wednesday to inquire, on behalf of the Local Government Board, into an application by the Town Council for permission to borrow £20,000 for purposes of electric lighting. Mr. T. C. Blofield laid the case for the applicants before the Inspector. He summarized the various reports of the Engineer of the scheme (Mr. Medhurst); and, in doing so, he compared the gas supply and what was expected to be effected by the electric light—his remarks revealing a rather curious financial arrangement between the Town Council and the Gas Company. The charge for the electric light was to be 6d. per unit, which, in Mr. Blofield's opinion, would make it cheaper than gas at 3s. 6d. per 1000 cubic feet, which they were paying. He mentioned that, when the Gas Company obtained their Act in 1849, the Corporation advanced them £2500, free of interest, on their undertaking to supply the street-lamps with gas at what they termed cost price—2s. 3d. per 1000 feet. There were now 323 gas-lamps, which cost £583 a year, including a calculation for interest on the £2500 advanced to the Gas Company; while under the electric lighting system there would be six arc lamps and 420 incandescent ones, which would cost £498. As a matter of fact, Mr. Blofield said, the lighting of the town was at present very insufficient. If the almanac said there ought to be a moon, it was assumed there was a moon; and, with one lamp lighted at the corner of each street, the remainder were given a rest. The Inspector here remarked that he went round the town on the previous night, and felt bound to admit that the lighting was exceedingly bad. Mr. Wild (who appeared on behalf of certain petitioners against the scheme) observed that the Corporation could have any amount of gas they liked at the same price, to which Mr. Blofield replied that, if the town were to be properly lighted with gas, the cost would probably be £700. Resuming his statement of the case, he showed how the total cost of the scheme was made up; his figures including an assumption that the Gas Company would give up the £2500 of which they had had the use. A long discussion took place on this point. Mr. Salmon (the Town Clerk) stated that the late Town Clerk was also Chairman of the Gas Company; and when it was proposed some time ago to take Counsel's opinion as to the free loan of £2500, the case was drawn up by Messrs. Leech and Son, an independent firm of Solicitors. Counsel's opinion was that, in the event of the Town Council no longer requiring gas for purposes of public lighting, the £2500 became immediately payable, and could be called in. The present Chairman of the Company (Mr. F. C. Andrews) had also said that he did not think, as honest men, they could keep the money. Several witnesses were called; and one of them (Mr. Jaggard), in cross-examination, was asked whether the financial arrangement with the Gas Company was not an advantageous one for the town. He replied that it was a very good one for the Company; but he admitted that he did not know of any town in the neighbourhood where the price of coal was the same, and where gas was supplied for public lighting at 2s. 3d. per 1000 cubic feet. In summing up the objections to the proposal, Mr. Wild contended that the scheme would be a serious matter for the poorer ratepayers, and especially for those who did not use electric light. No less than 44 provincial authorities were working electric lighting systems; and of these 21 made a surplus and 23 a loss. Out of the 44 towns, there were only 15 which had a population of less than 50,000; and of these four had a surplus and eleven a loss. Mr. Wild asked the Inspector to advise the Board that Bury should be instructed either to abandon this scheme altogether, or to substitute a greatly-modified proposal upon which their 'prentice hands might be exercised. The inquiry lasted seven hours.

Derby and District Residual Products Committee.—A meeting of this Committee, the formation of which, under the chairmanship of Mr. F. C. Humphrys, of Ilkeston, was announced in the "JOURNAL" some months ago, took place on the 15th inst., at the Midland Hotel, Derby—nearly all the Companies constituting the Committee being represented. Seven tenders which had been received in response to the Committee's invitation were opened; and it was found that the best price offered was at least 7s. above that quoted in our "Current Sales." Most of the members will therefore receive better prices for their tar and liquor, though general quotations are lower. This new departure has, therefore, been productive of good. The object of the Committee is not, however, to force up prices, but to be sure that they get the market rate, be it high or low, for their products—a condition of things which, they say, did not always obtain before. The idea has been entertained that, in the event of the Committee not receiving any tenders, they would deal with their products themselves at central works; but, of course, they would not do this unless compelled.

Southport and the Gas Supply of Birkdale.—The Birkdale District Council are proposing to carry out several improvements in the town, among them being the laying of new gas-mains. For this purpose £1500 is required; and the sanction of the Local Government Board has been sought to the borrowing of it among other sums. Last Tuesday, Colonel C. H. Luard sat at the Town Hall to hear evidence regarding the application. He was informed by the Law Clerk (Mr. J. J. Smallshaw) that the gas distribution system in the district belonged to the Birkdale Council; but the gas was supplied by the Southport Corporation. For the use of the mains, the latter paid 4½d. per 1000 cubic feet of gas consumed by private consumers, and a royalty of 3½d. per 1000 cubic feet for the privilege of supplying the gas. Birkdale therefore received 8d. per 1000 cubic feet of gas supplied. On the other hand, the Corporation charged them 3s. 6d. per 1000 cubic feet, as against 3s. in Southport. These figures did not include street lighting. The Inspector: They do not let you off very cheaply. The Law Clerk observed that there had already been a Local Government Board inquiry and a fight on the subject. The Inspector: They seem to get back 6d. out of the 8d. they pay you. The Law Clerk: Yes, the difference is only about 2d. The Chairman of the District Council (Mr. T. O. Clinning) asked the Inspector to use his influence to obtain for them the borrowing powers as early as possible, in order that they might proceed with the laying of the gas-mains in readiness for the lighting season. The Inspector did not think it would take long, as matters of this kind were now left more in the hands of the Inspectors than formerly.

METROPOLITAN WATER SUPPLY COMMISSION.

Thirteth Day—Monday, July 18.

(*Viscount* LLANDAFF, *Chairman*, *Sir* JOHN E. DORINGTON, Bart, M.P., *Sir* G. B. BRUCE, M.Inst.C.E., *Major General* A. DE COURCY SCOTT, *Mr.* A. DE BOCK PORTER, C.B., *Mr.* H. W. CRIPPS, Q.C., *and Mr.* R. LEWIS.)

The sitting took place at the Guildhall, Westminster.

The following Counsel are engaged: Mr. POPE, Q.C., and Mr. CLAUDE BAGGALLAY, Q.C., for the New River Company; Mr. LITTLER, Q.C., and Mr. LEWIS COWARD for the Kent Water Company; Mr. PEMBER, Q.C., for the Lambeth, East London, Grand Junction, and West Middlesex Water Companies; Mr. RICKARDS for the Chelsea Water Company; Lord R. CECIL for the Hertfordshire County Council; Sir JOSEPH LEESE, Q.C., M.P., for the Kent County Council and Kent Local Authorities; Mr. BALFOUR BROWNE, Q.C., and Mr. FREEMAN, Q.C., for the London County Council; Sir R. NICHOLSON for the Middlesex County Council; and Mr. GABRIEL P. GOLDNEY (Remembrancer) for the Corporation of the City of London. The Southwark and Vauxhall Water Company are represented by Messrs. BIRCHAM AND CO.

Mr. *Henry Weeden*, Vice-Chairman of the Ilford Urban District Council, said the district was growing at a phenomenal rate—1000 or 1500 new houses a year. The water supply was given by the East London and South Essex Companies; both having concurrent powers of supply over the whole area. They had, however (by agreement presumably), partitioned the district between them. The charges of the East London Company were 5 per cent. on houses whose rateable value did not exceed £30; and those of the South Essex Company were 7½ per cent. on similar houses. As the bulk of the houses in Ilford were under £30 rateable value, this charge of 7½ per cent. meant an increase of the water-rate by 50 per cent. The charges in respect of houses over £30 annual value were also in favour of the East London Company. The growth of the district was very largely in the South Essex Company's zone. His Council preferred the East London Company's supply on all grounds. The South Essex Company obtained their water from Grays—from wells and chalk pits. The local Council had never attempted to compel the East London Company to give a supply in the South Essex Company's district, by tendering the necessary guarantee of rates for three years.

The CHAIRMAN remarked that if an abstract furnished by the London County Council was correct, the East London Company were exempt from supplying in any district where another Company were actually supplying.

Witness (continuing) said his Council wished to have power to buy up the works of the East London Company in their district, and to compete with the South Essex Company. As an alternative proposal, the Council thought the Government might give the London County Council power to buy the works of the East London Company; and in this event the London County Council could supply water in bulk, and the local Council could sell it in competition with the South Essex Company.

Major-General SCOTT: So long as the South Essex Company are able to supply water, are you not precluded from giving a supply?

Witness: We think the law might be amended to allow us.

The CHAIRMAN: I do not think the law prevents them. It only exempts them from the obligation.

Witness (continuing) said he thought the London County Council would be quite willing to supply his Council with water in bulk, until the local Council obtained sources of their own. In a certain portion of the South Essex Company's district, the charge was based on the net rateable value; in the remainder, on their own estimate. In the East London Company's district, he believed, the charge on each house was a few shillings in excess of the net rateable value.

Mr. *F. G. Banbury*, M.P., Trustee and Manager of the Stock Exchange, said he had framed a scheme of purchase of the London Water Companies which would not increase the rates now paid by the consumers, and would give the consumers, free of cost, any increase of profits. He proposed that Parliament should create a small statutory central body, selected something on the lines of the Indian Council, and consisting of not more than nine or ten members. They should be paid members and experts—men of business who were accustomed to administer water matters. This body should be authorized to create a 3 per cent. perpetual stock secured on the water-rates, transferable at the Bank of England, and in which trustees should be entitled to invest. Each share or debenture holder in a Water Company should receive as much of this new stock as would yield him the dividend he was now receiving. The purchasing Authority would thus require to raise no more income than the Companies were raising at present, because they would only give sufficient of the stock to the shareholders to meet the income they were now receiving. The statutory body would purchase the Companies by means of this new stock. One advantage of the scheme would be that, whereas if the purchase were by a cash payment some £30,000,000 or £40,000,000 would have to be raised—which would occasion considerable difficulty in the Money Market; by his plan no money would have to be raised at all. The advantage to the seller would be that he would receive a fixed income, secured upon the water-rates of London, in the form of stock in which trustees would be entitled to invest. This latter condition was one which water shareholders did not enjoy at present. It was of considerable importance, however, and would materially increase the value of the stock. In this way the sellers would receive an ample sum for their undertaking; while the purchasers would pay nothing beyond what they were at present paying.

Mr. DE BOCK PORTER: Would you treat dividends of all the Companies as of equal intrinsic value?

Witness: I should take what each shareholder is receiving from his Company. If he is receiving 8 per cent., he would get sufficient stock to pay him 8 per cent., and so on. For this purpose, I should take the dividends last available.

The CHAIRMAN: The Company may be paying 8 per cent., but may have capital expenditure in front of them which will reduce it by 1 or 2 per cent. If you crystallize the 8 per cent., you are giving them a vast sum.

Witness: You must take the rough with the smooth. During the past twenty years the dividends of the Companies have largely increased, though there has been considerable capital expenditure during the time. I should allow nothing for prospective value; and, on the other hand, no deduction would be made for future possible expenditure, which might diminish the income very largely. If the water-rates were insufficient to pay the 3 per cent., they would have to be increased.

As I understand, there is to be no arbitration?—No; you do away with all that expense.

Sir J. DORINGTON: The shareholder in a good Company would have adequate compensation in the increased capital value of his stock; and the shareholder in a bad Company would obtain rather extravagant remuneration?—Yes. There is no scheme that has not one or two objections to it.

In answer to further questions, witness said a shareholder in the Southwark and Vauxhall Company would get the same relatively as a shareholder in the best of the Companies. His scheme would not prevent the dividend—the basis of the new stock—being fixed by arbitration. He had not provided for this because the Water Companies were subjected to Government control; therefore he assumed that their dividends were proper and fair. The essence of his scheme was purchase by dividend, instead of purchase by capital value; and he wanted some easy way of ascertaining what the dividend was. The dividends of the Companies during the past twenty years had been very regular, save in 1894; the tendency being upwards. This might make shareholders want more, but not if they understood the value added to the stock by making it a trustee stock, transferable at the Bank of England. He provided no means of extinguishing the stock; seeing no reason why the present generation should pay for the benefit of the future. He would drop the right to receive back dividends altogether. To provide funds for increasing the works, the statutory body would have to have power to create more stock of a similar character, also secured on the rates. No doubt, the new Authority would have to spend more money, but not unless there were new customers, who, as in the past, would provide a remunerative return on the capital invested. The Companies had undertaken large expenditure the last few years; but their dividends had not decreased much. The water charges would be levied by the new body; and they would probably be reduced by the amount of the saving caused by the amalgamation of the Companies, and by reason of the growth of consumption, which in the past had meant increased dividends to the Companies. If London did not continue to grow, the consumers would be in no worse position than now. He had mentioned his scheme to, perhaps, the largest water shareholder; and he was anxious to see it carried through. He agreed that his scheme was in some respects similar to that of the late Mr. Smith. If the London County Council were substituted for the statutory body, witness's scheme would work well for the shareholders; but he doubted whether it would for the ratepayers. The City had not much faith in the capacity of the County Council. In his scheme he considered he was disposing of the question of back-dividends by increasing the value of the stock.

Mr. LEWIS: Suppose Parliament were not to sanction a perpetual annuity of this kind—and Parliament is very likely to object to it—are there no means of retaining the stock as a trustee stock, and at the same time providing for its being extinguished in 80 or 100 years?

Witness: Yes. Trustees are empowered to invest up to a certain premium in a terminable stock; but if you start with a sinking fund, you at once do away with the advantages that will accrue to the ratepayers. Given a business body to carry out the scheme, I believe in five or six years the water-rates would be reduced, and the supply be as good as now. I do not think Parliament would make any difficulty about the stock being irredeemable, though they had only sanctioned redeemable stock where Local Authorities had borrowed money. The body he proposed would be appointed by the Government, and would always be under the control of Government, and, in this way, of Parliament. He should prefer to leave the control entirely with the Government. If a Local Authority had a complaint, they would be able to bring an action, if necessary. He should think the County Council could get a loan of £40,000,000 or £50,000,000 on the Stock Exchange, secured on the water-rates first and then on the rates of all London or the Metropolitan Counties, at about £2 16s. per cent. His scheme could not be passed, he thought, if strenuously opposed by the Water Companies.

By Mr. POPE: The advantage of the scheme to the shareholders would be the great increase in capital value of their stock, which would arise from their receiving stock in which trustees could invest. The security would be better than now, because at present the Companies could not increase their rates; whereas the new body would have power to do so if necessary. By excluding back-dividends, he did not refer to those at present being paid, but to the payment of them in future. Whatever was paid for the undertakings, it would be better that it should be in equivalent stock, and not cash. To decide what the income of the Companies was, he should take the last year. In this way, he should take the dividend of the Kent Company at 13 per cent., and thus perpetuate the 3 per cent. on account of back-dividend which they were paying. Under Mr. Smith's scheme, a certain income would have had to be purchased; and the Companies had never earned this income. Under witness's scheme, the Companies were earning the money that would have to be paid.

By Mr. PEMBER: In the case of the Lambeth Company, who last year paid 10 per cent., and might have divided £19,000 more as back-dividends, he should take the dividend at 10 per cent. They must assume there was a good reason for not dividing the £19,000.

The CHAIRMAN: You take the dividend income, and not the actually earned income?

Witness: Yes.

Mr. PEMBER: Your scheme would make the Companies give up all prospective value and the right to back-dividends, both of which would be very important concessions as against the Companies; and you say this would be met by the fact that they would get enhanced capital value?

Witness: Yes.

By Mr. H. L. CRIPPS (representing the London County Council): In 1893, when the East London Company were before the House of Commons, he said he was authorized to speak on their behalf; but he had no special interest in the Company. He had had no direct communication with the Water Companies regarding the present scheme; but he had shown it to one or two of the Directors. The scheme was his own idea altogether, and was not suggested on behalf of any Company. Parliament, in granting a loan to a Local Authority, had no control over that Authority;

but in this case it would have control over the body, and would not therefore object to granting powers without insisting on the provision of a sinking fund. The agreements of the Companies to sell, arrived at in 1880 through Mr. Smith, were too favourable to the Companies. He did not think it would be necessary to have the dividend the Companies were paying, which would form the basis of transfer, investigated by arbitration, having regard to the legal rights and obligations of the Companies and the probability of future expenditure. If the total revenue of the Companies available for interest and dividends was £1,180,788, and the revenue actually paid away £1,128,811, he should take the latter figure, because there might have been legitimate and proper reasons to prevent the distribution of the whole amount.

The CHAIRMAN: You would not allow the arbitration to take place upon the lines the County Council suggest—that much of the capital is obsolete, and ought to be struck out?

Witness: No.

Or as to whether certain charges (statutory or not) were equitable or fair?—No.

Mr. *Allen Stoneham*, Auditor of the Accounts of the Metropolitan Water Companies, a position he had occupied since the Act of 1871, said he was limited in the investigation of the capital of the Companies to periods prescribed by that Act, varying from 1864 to 1869, antecedent to which he was not to examine. To arrive at what the existing capital of each Company was at each of these specified dates, he practically audited the accounts for some years, and so ascertained the method in which they had been kept, and satisfied himself that they were pretty well kept. Every year after these dates, he only allowed the sum to go into capital which was properly chargeable in that way. There was nothing to be written off for deterioration. If an engine (say) was worn out, it would be replaced out of revenue; but witness did not use his own eyes to see that the engine was actually replaced—accepting the statement of the Engineer as to the fact. Before the water famine of 1894-95, he was not aware that any pipes were likely to burst. When the accounts came before him later on, it was suggested that a certain portion of this expense might be attributed to revenue and a certain portion to capital, on the ground that if the pipes had been laid at a lower level more capital would have been expended. Witness thought this reasonable, and the expense was so divided. He thought the capital of the Companies, as a rule, represented a fairly going concern, in working order. Of course, a good deal of it must have been expended on works that were now obsolete; but, on the other hand, no doubt some of the property had increased in value.

Mr. DE BOCK PORTER: When you began your examination of the capital accounts, did you not find very varying practices in the judging between capital and income?

Witness: I think on the whole it was very fairly done.

The CHAIRMAN: Would you not admit that there is a very large sum in the Chelsea Company's capital account which represents works very little used now, or of little value?

Witness: I have no official knowledge of that. I have no opportunity of forming such an opinion.

Mr. DE BOCK PORTER: You only look to the accretions to the capital since your audit commenced?

Witness: Certainly.

The CHAIRMAN: And you can say all these accretions have been proper at the time they were made?

Witness: Yes.

Mr. DE BOCK PORTER: The Companies never look into their undertakings as a commercial matter, and write off so much for depreciation.

Witness: No.

You only look at the expenditure as it is made?—Yes.

You do not, and cannot, judge whether the sums paid are proper for the purpose for which they are paid. All you can judge is whether the purpose of the work is a proper capital purpose?—That is so.

By the CHAIRMAN: In proceeding against a Company, he had to bear the expense out of his own pocket. He had fought one case, and was now taking Counsel's opinion on another. In an arbitration before Sir Henry James, he had the present Solicitor-General and Mr. Justice Wright against him. The Arbitrator practically argued the case for witness from time to time; but witness found himself at such a disadvantage, that he determined in the next case that he would employ Counsel, and so he feed Mr. Danckwerts. The expense fell upon him, as there was no provision in the Act by which he should have legal assistance. Witness at present had a difference with the Southwark and Vauxhall Company, and was taking Mr. Danckwerts' opinion as to what he should do. He could not suggest any further powers that were necessary to him for a proper audit; and he did not consider himself in any sense retained by the Companies because they found his salary. The money was collected by the Local Government Board, and paid by them to him.

By Mr. DE BOCK PORTER: He had always held it was the duty of the City Chamberlain to see that the sum he received under the operation of the sinking fund clauses was proper. Witness always passed the sum.

Mr. *R. E. Middleton*, M.Inst.C.E., M.Inst.M.E., examined by the CHAIRMAN, said he had been an Assistant-Commissioner to Lord Balfour's Commission, Joint Engineer with Mr. Hunter for the Staines Reservoirs Bills of 1896 and 1898, and Joint Engineer with Mr. Francis for the New River Company's Bill of 1896. He did not believe the purchase of the Metropolitan Water Companies' undertakings by anybody to be financially expedient in the interests of the consumers. Any purchase based on the full value of the undertakings must simply be a change of investment, so that there would be no profit in it. He did not, however, wish to be understood as saying that purchase would not pay at some future time, because that was a problematical thing which he could not enter into. If the consumption went on increasing as it had done, purchase would very likely pay eventually. At no time would the Companies cost less than at present. Undoubtedly some capital expenditure or other would be necessary, either for the Companies if they continued to exist, or for the purchaser if purchase took place. Witness had considered the comparative cost of the two schemes so far laid before the Commission—the Staines Reservoir scheme and the Welsh scheme. The Welsh scheme was much the most costly. In his estimates, he had assumed that 200 million gallons a day would be allowed to flow over Teddington Weir. At present the London Companies were authorized to pump 130 million gallons a day from the river; or, adding 20⅓ million gallons under the Southwark and Vauxhall Act and 35 million gallons under the Staines Reservoir scheme, 185½ million gallons daily.

The CHAIRMAN: I suppose the proper thing is to find out the cost of storage reservoirs and filters for this quantity?

Witness: The work must be done, whether the Companies are purchased or not.

Then we ought to consider what would be the cost of providing sufficient storage and filtration for 130 million gallons?—The filtration is already provided; and the storage very nearly. I think you may disregard it up to 185 million gallons.

Assuming that 300 million gallons will be ultimately drawn from the Thames, this leaves storage to be provided for 114⅓ million gallons?—Yes; but Lord Balfour's Commission never limited the amount to 300 million gallons.

At any rate, they suggested that 300 million gallons might be taken from it without injury. Have you considered the cost of providing storage for 114⅓ million gallons?—Well, I have taken it at 123½ million gallons—this being the capacity of one reservoir in Wales.

What would be the cost of carrying out what I may call the Staines Reservoirs condition for this 123½ million gallons?—The total capital cost would be £4,337,408.

What is the cost to pump both for storage and supply?—£1,239,854.

What reservoir space do you provide for the 123½ million gallons?—18,000 million gallons. The natural flow of the Thames is always in excess of 200 million gallons daily.

The CHAIRMAN said he was sure Sir A. Binnie placed diagrams before them showing that there were many days when the natural flow was below 200 million gallons.

Witness pointed out that this was after the quantity actually being pumped had been extracted.

The CHAIRMAN: We have this evidence: "In 1883, there were 286 days when the flow of the river fell to or below 200 million gallons."

Witness: That is perfectly accurate. It is because you have to calculate the Companies are pumping above that, and taking 110 million gallons a day. The natural flow would have been actually above that if the Companies had stopped pumping.

This does seem to show that you must make in your reservoir scheme allowance for those days in which the pumping of the 130 million gallons at present authorized would reduce the flow below 200 million gallons?—That is perfectly true; and this storage amounts to 1802 million gallons. It is sufficient storage for providing for the present 130 million gallons and not reducing the flow below 200 million gallons. The total expenditure that the Companies or a purchaser of the undertakings would have to provide to secure 123½ million gallons in addition to the 185 millions already authorized is £5,577,262. The cost of pumping I have taken as lasting for only twenty years; whereas Sir A. Binnie calculated that it would go on for ever. If counted as going on in perpetuity, it would add about £600,000 to my estimate.

By Major-General SCOTT: One principal point in which witness's estimate differed from that of Sir A. Binnie was as to the amount of reserve reservoirs necessary to meet cleaning, and dirty water at the base of the reservoir, and evaporation. The storage necessary, according to witness, was 18,000 million gallons; according to Sir A. Binnie, it was 28,000 million gallons. Sir A. Binnie said two reservoirs must be put out of use for purposes of cleaning; and the amount of reserve water which would not be used was to be one-eighth of the whole. This practically amounted to the difference of 10 million gallons. Witness held that it was absolutely not necessary to have any reservoirs out of use, because the amount of mud collected, if they took the very dirtiest water out of the Thames during the whole time, would not amount in twelve years to more than ¼ inch, 90 per cent. of which would be water. It would only be necessary to have the reservoir cleaned once in thirty years; and this could be done when a new reservoir was made. For evaporation, 10 per cent. was quite sufficient. The remarks he had made in reference to cleaning applied equally to bottom water. The amount of silt, as far as he could make out, never exceeded 2 grains a gallon. If they had a mass of water in a reservoir, he agreed that at every foot of depth the silt would increase; so that in the lowest portions they would have a considerable amount suspended. But as the water was drawn down, so the silt would settle. From experiments he had made, he found that a very large proportion of the silt subsided after three days' storage. There was no reason why water should not be pumped when the river was in its very worst state. After storage for six to ten days, it would be perfectly innocuous and harmless. Witness's figure per million gallons for the construction of the reservoir was £155, against Sir A. Binnie's £380. The latter, however, included items excluded from the former. Taking the actual figure for storage capacity in each case, there was not much difference between the two figures.

By the CHAIRMAN: The reason only 5000 million gallons of storage was required to supply 185 million gallons daily, whereas 18,000 millions storage was required for a subsequent supply of 123 million gallons, was that on the average of years 185 million gallons could be obtained from the river almost without storage at all. Witness, however, only calculated on not taking water for twelve days after flood, whereas Sir A. Binnie allowed fifteen days.

The CHAIRMAN pointed out that, according to Sir A. Binnie, the cost yet to be incurred in respect of the 185½ million gallons was £4,705,000; and the cost of obtaining 300 million gallons a day, £15,589,000. The difference between the two—more than £10,000,000 (representing the cost of the extra 114⅓ million gallons)—corresponded approximately with witness's £5,577,000. What accounted for the enormous difference?

Witness replied that Sir A. Binnie took the storage at 28,000 million gallons, whereas he (witness) put it at 18,000 million gallons.

The CHAIRMAN said that was not so, because 8000 million gallons had to come off Sir A. Binnie's figure for existing authorized supply.

Witness admitted that it was so. He presumed the error was partly in the £350 per million gallons, because he had been into the figures by the sums spent on the Staines reservoirs.

The CHAIRMAN said they had had it in evidence that the Staines reservoirs cost £380 per million gallons.

Witness said that was where the error lay. Sir A. Binnie had taken

the supply as being 35 million gallons. This was the quantity put upon the Staines Committee by Parliament; but the Staines reservoirs were capable of supplying 54 million gallons.

The CHAIRMAN: Do you mean you made your reservoirs too big for what Parliament authorized?

Witness: They were made according to the original plans.

Sir J. DORINGTON: In other words, you have to divide their cost by 54, instead of 35.

Witness (continuing) said he had also calculated what it would cost to bring 123½ million gallons from Wales, on the analogy of the Manchester, Liverpool, and Birmingham schemes—the best, and, as he thought, a fair and reasonable way of arriving at a conclusion.

The CHAIRMAN: Give us now your estimate for bringing 123½ million gallons from Wales.

Witness: The capital cost is £20,910,998.

That is, you make out that the Welsh scheme would be four times, or nearly, as costly as the Thames storage scheme?—Yes. The amount that will have to be spent in order to provide storage for the 185½ million gallons already authorized to be taken from the Thames is £858,287, if the work is undertaken in the most economical way.

Witness had not concluded his evidence-in-chief when the Commission adjourned.

The thirty-first sitting of the Commission was held yesterday at the Guildhall, Westminster—Viscount Llandaff presiding. It is probable that this sitting will prove to be the last before the summer vacation. Mr. Reginald E. Middleton, whose examination was not concluded when the Commissioners last sat, was further examined, and also, at the suggestion of Mr. Pember, questioned with regard to certain matters in his proof which had been ignored on the last occasion. Counsel pointed out that witness's evidence was directed not merely to criticism of tables and statements of preceding witnesses, and notably those of Sir A. Binnie, but also to establishing the substantive case for the Water Companies in relation to evidence to be given later.

THE WATER PROVISIONAL ORDERS OF THE SESSION.

The Board of Trade have issued a memorandum stating the nature of the proposals contained in the Provisional Orders included in the Water Orders Confirmation Bill. There are six Orders, relating respectively to Broughton-in-Furness, Hayling, Portsmouth, Ross, St. Neots, and Wrexham. The first Order is to empower the Broughton-in-Furness Water Company, Limited, to construct and maintain water-works, and to supply water within the town of Broughton-in-Furness, and the hamlets of Sykehouse and Kepplewray, in the township of Broughton West, in the county of Lancaster. The second is to authorize the South Hayling Water Company, Limited, to carry out additional works and extend their limits of supply. The Portsmouth, Ross, and Wrexham Orders are to sanction the raising of additional capital; and the St. Neots Order is to empower the St. Neots Company to construct and maintain water-works.

GLASGOW CORPORATION WATER SUPPLY.

Report for the Year 1897-8.

During the past forty-two years, the water supply of Glasgow has been one of the marvels of that great seat of municipal government. In the year 1856, the Act of Parliament by which the supply of water became transferred to the Corporation, and which was passed on July 2, 1855, came into full force. The price on the north side of the Clyde started at 1s. 2d. per £1 of rental for the domestic supply; and for the past half-dozen years the whole of the city, on both sides of the river, has been getting a constant service of Loch Katrine water at only 6d. per £1 of rental, while it is confidently anticipated that next year another penny will be taken off the domestic rate. The annual report on the undertaking, with its myriad of statistics, was laid before the Water Commissioners of the city last Thursday, and its principal features are given below.

Dealing first of all with the financial portion of the report, we find that the ordinary revenue for the past year amounted to £204,216; that from hydraulic power works, to £3471; and from river supply works, to £3685—in all, £211,372. Adding the balance brought from the previous year, £40,786, makes £252,158. The expenditure, including annuities, amounted to £146,464; that for hydraulic power works, to £4829; and for river supply works, to £3791—together, £155,084, leaving a balance of £97,074. There has been carried to sinking fund accounts, £57,302; and the balance carried to the credit of the revenue account for the year 1898-9 is £39,772. This balance is carried forward to meet the compulsory sinking fund on the cost of the new works, which came into operation last year. The total revenue for the past year, as shown above, was £211,372; that for the previous year was £201,226—being an increase of £10,146. The total expenditure for last year, exclusive of the sum carried to the sinking fund, was £155,084; that for the previous year was £148,961—being an increase of £6123.

Next in order there follows the amount expended on new works and added to capital account during the past year. It was £71,069. The capital expended on the new works now being constructed under the Acts of 1882, 1885, and 1892, amounts to £1,339,598. Under the Act of 1892, the borrowing power was increased to £3,250,000. But there are given several items, such as funded debt issued, Corporation loans fund account, &c., which collectively make up a total of £3,160,601; so that there is unexhausted borrowing power to the amount of £89,399. The sinking funds set apart for the redemption of annuities and the repayment of moneys borrowed in terms of the Acts, including the redeemed mortgage account, now amount to £896,705.

Coming to the part of the report referring to works, we learn that the portions of the new aqueduct from Loch Katrine which have been completed continue to discharge an increased quantity of water into the service reservoirs. Of the 23½ miles of which the new aqueduct consists, there now only remains the Loch Katrine tunnel contract, 1¼ miles long, to complete the whole. This contract will take two years to finish; but the driving of the tunnel will be completed in about two months, when the construction of the basins at the entrance from the loch will be commenced. The service reservoirs of Mugdock and Craigmaddie continue in good order; and the supply to the high levels of the city has been much improved by their joint use. The Gorbals works and reservoirs are in a proper state of repair. A contract has recently been made for the deepening of the remaining portion of the edge of the Balgray reservoir, with the view of preserving the purity of the water stored therein. Details are then given of the pipe-laying work of the year, amounting to 30,241 lineal yards, or upwards of 17 miles.

With regard to the supply of water sent into the city and district during the year ending the 31st of May last, it averaged as follows: From the Loch Katrine works, 46,642,223 gallons per day; from the Gorbals works, 4,808,642 gallons per day—together, 51,450,865 gallons per day. The average for 1896-7 being 49,786,667 gallons, there was an increase of 1,664,198 gallons. The use of the hydraulic power water continues to increase. The number of machines now supplied is 238—being an augmentation of 85 during the past year; while there are applications for 60 others still on the books of the Water Committee waiting for the completion of the buildings or machinery. The quantity of water furnished to the river supply works averaged 2,780,700 gallons per day for 1897-8, as compared with 2,513,674 gallons per day for 1896-7; being an increase of 267,026 gallons.

LOSS OF WATER FROM PIPES.

A paper on the above subject was presented by Mr. F. H. CRANDALL, the Superintendent of the Water-Works Department at Burlington (Vt.), at the last meeting of the New England Water-Works Association, and was published in a recent number of the "Engineering Record." The following are some extracts therefrom:—

The determination of the loss of water from any considerable system of underground piping is at best problematical, and does not admit of definite unquestionable solution; but in the case which I will endeavour to present for your consideration, some of the difficulties ordinarily encountered have been eliminated. Systems, even of such small extent as that to which your attention is invited—on which for months at a time there is no occasion to open public fire hydrants, on which there are no large manufacturing concerns using water for fire purposes, and on which all ordinary legitimate use is metered—are not numerous. On the Burlington high service, however, it has recently come about that these conditions obtain. By far the larger portion of the pumpage on this service is accomplished by a motor; an auxiliary steam plant being used only when it becomes necessary.

The works were built in 1880 and 1881, and now serve the University buildings, the State Agricultural Experimental Station and its farm buildings, two Roman Catholic schools, one hospital, and five Summer residences with innumerable fixtures, besides 45 dwellings, nearly all of which are supplied with modern conveniences in plumbing. Some of the mains were laid in rock cut; and some are, for the greater portion of the year, below the ground water-level.

The service comprises an iron tank of 2260 cubic feet capacity, 9671 feet of cast-iron mains from 4 to 8 inches in diameter, and about 1560 feet of 4-inch cement mains, with six public fire hydrants, one 4-inch and two 2-inch services supposed to be used for fire purposes only, 62 metered taps, through which water is used for domestic supplies, one 3-inch metered elevator service, one 2-inch overflow (metered), and one 1½-inch metered service used to supply power for operating the valves of the motor. Each of the meters at the time of setting registered, on full size ⅛ and 1-16th inch streams, not more than 2 per cent. fast nor more than 3 per cent. slow. By sizes, the meters in use are one 3-inch, two 2-inch, two 1½-inch, seven 1-inch, seven ¾-inch, forty-one ½-inch and five ⅜-inch.

As the discharge of the motor is conveyed to the tank by way of the distribution system, and thus far conditions have not been favourable for accurate measurement, the losses in the pump can be arrived at only by estimation. The plunger in the pump end of the motor, which works against about 41 lbs. static and 43 lbs. dynamic head, is $4\frac{7}{8}$ inches in diameter, and is provided with a double-cup leather packing, which has frequently been found, when the plunger is not in motion, to be absolutely tight at different points of the stroke. In motion, a small leakage is developed. There is also leakage of the ports. The suction and discharge ports of the motor pump are each 12 in number, about 3 inches in diameter, and capable of ½-inch lift. The motor runs at from 4 to 32 strokes per minute, and will not go many minutes at the maximum speed. The average is about 12 strokes a minute. Besides the losses common to all pumps, a further source of error in the counter measurement in this case is the shortening of the stroke on small streams like that in small meters, which in this case reaches at times 3 per cent. of the stroke. It is not, however, expected that in practice the motor will be required to run for any considerable length of time on a very small flow. The records for the two periods into which the whole time may be divided, during one of which the steam-pump was used, and the average daily consumption was about 4770 cubic feet, and during the other when the pump was not used, and the average daily consumption was about 3552 cubic feet, do not differ materially in the percentages not measured. In taking the statements of the meters recording the consumption, about two hours are consumed; and the counter of the motor is read during that time. In determining the correction to be applied to the counter record for losses on the pump, taking the leakage of the ports at the mean noted during several tests, made under static pressure, that of the plunger at the mean noted while moving with considerably less than its usual velocity against the static pressure, and that of the stuffing-box at an arbitrarily chosen amount equal to one-half that of the plunger, we have an aggregate loss, under the conditions noted, of about 1 per cent., and, for purposes of estimation, we will assume the losses under working conditions at 5 per cent.

Records are at present obtainable of the pumpage and consumption on this service for a period of eleven months, during which every legitimate

use was made of water. During the first eight months, the steam plant was used only five times. The total quantity of water handled was 1,144,907 cubic feet—1,088,563 cubic feet, or about 95 per cent., by the motor, as per indicator, and 56,344 cubic feet, or about 5 per cent., by the steam plant. Of this indicated pumpage, 729,282 cubic feet, or about 64 per cent., were metered to the consumers; 193,285 cubic feet, or about 17 per cent., to the motor; 39,040 cubic feet, or about 3 per cent., to the overflow; 27,630 cubic feet, or about 2 per cent., were estimated to the consumers; 57,245 cubic feet, or about 5 per cent., were the estimated loss in the pump, and 93,425 cubic feet, or about 9 per cent., were not accounted for. During the last three months for which records are obtainable, the steam plant was not called upon at all. The total amount of water handled was, according to the indicator, 319,734 cubic feet. Of this indicated pumpage, 230,375 cubic feet, or about 72 per cent., were metered to the consumers; 40,360 cubic feet, or about 13 per cent., to the motor; 1680 cubic feet, or about 0·5 per cent., to the overflow; 2024 cubic feet, or about 0·5 per cent., were estimated to the consumers; 15,986 cubic feet, or about 5 per cent., were the estimated loss in the pump; and 29,309 cubic feet, or about 9 per cent., were not accounted for. During the entire periods for which records are available—eleven months ending Feb. 1, 1898—the total amount of water handled was 1,464,641 cubic feet—1,408,297 cubic feet, or about 90 per cent., by the motor, as per indicator, and 56,344 cubic feet, or about 4 per cent., by the steam plant. Of this indicated pumpage, 959,657 cubic feet, or about 35 per cent., were metered to the consumers; 233,645 cubic feet, or about 16 per cent., to the motor; 40,730 cubic feet, or about 3 per cent., to the overflow; 29,654 cubic feet, or about 2 per cent., were estimated to the consumers; 73,232 cubic feet, or about 5 per cent., were the estimated loss in the pump; and 127,733 cubic feet, or about 9 per cent., were not accounted for.

In the "Transactions" of the American Society of Civil Engineers for December, 1897, there is printed some information on the same subject contributed by Mr. C. F. Loweth in a discussion on a paper by Mr. Emil Kuichling. In this paper the leakage in a well-constructed distribution system is estimated at 2500 to 3000 gallons per mile daily—an amount far too large in the opinion of Mr. Loweth, who has come to the conclusion that the leakage can be kept within 60 to 80 gallons per inch-mile of pipe per 24 hours, or 600 to 800 gallons per mile of 10-inch pipe-line. These figures are deductions from tests of several new pipe systems, in most cases before any service connections were made, and are believed to be within the ability of honest and experienced workmen. In the same discussion, Mr. G. S. Williams described the leakage from a distribution system comprising 3487 feet of 10-inch pipe, of which a length of about 3000 feet was submerged in a river crossing, and 4700 feet of 8-inch, 10,820 feet of 6-inch, and 6300 feet of 4-inch on land. Connected to the 8, 6, and 4 inch pipes are 20 hydrants and 12 gates; and on the 10-inch pipe are three gates. The pipe, where submerged, was laid with special ball joints every four to seven lengths; the remaining joints being of the ordinary bell and spigot type. This pipe was laid in 1893, and was first tested in July, 1894, by pumping through a 3-inch disc meter. With an average pressure on the pipe of about 90 lbs., the leakage amounted to 599 cubic feet in 12 hours; and with a pressure of about 50 lbs., tested after the higher pressure, the leakage was 277·5 cubic feet in 12 hours. In the fall of 1894, the 8-inch line was laid by day labour, and was tested at about 50 lbs. pressure in the open ditch; leaks being repaired before covering. In 1896, the 6-inch and 4-inch pipes were laid by contract; and the test in the open ditch was not required, though the contractor made use of it to some extent. In November, 1896, the whole system was tested; the river crossing being investigated first. The crossing and the approaches were 3487 feet long, of ordinary 10-inch cast-iron pipe, and contained 306 ordinary and 49 ball joints, as well as three gates. It was ordinarily supplied through two 6-inch disc meters. For this test a new ¾-inch disc meter was coupled in, so that by closing the gates the water passed through a 6-inch meter, then through the ¾-inch meter, and finally through the other 6-inch meter to the pipe to be tested. The water was taken from the city mains, which are supplied by direct pressure. To reduce as far as possible any leakage past the 10-inch gate at the farther end in the original test, a 10-inch cap had been leaded into the pipe; but for the last test two gates controlling the two branches of the pipe, about 15 feet behind the 10-inch gate, were closed, and then the latter was shut. The three meters were read every five minutes, and pressure-gauge readings were taken at both ends of the line every minute. The pressure on the pipe at the level of the river was between 42 lbs. and 43 lbs. The leakage was found to be 745 gallons a minute. The test was then extended to the rest of the system; the same meters being used in a like manner. The record was taken for 20 minutes with all the services shut off; and there resulted a leakage in the entire system, including the 10-inch line, of 4847 gallons a day.

Wolverhampton Corporation Water Department.—The annual report of the Water Committee of the Wolverhampton Town Council shows that the profit for the year, after paying interest on capital and providing for the sinking fund, amounts to £4459, out of which £4000 is to be transferred to the improvement fund. The total expenditure incurred in respect of the trial borings at Dimingsdale, amounting to £859, has been debited to revenue account during the year; and this, it is stated, more than accounts for the diminution of the profits as compared with those made in the previous twelve months.

The Consumption of Gas at Coventry.—The financial results of the working of the Coventry Corporation Gas Department during the year ending March 31 have already been published; and now we have, in the abstract of the audited accounts of the Corporation, some interesting information regarding the remarkable development in the consumption of gas in the city during the last few years. The quantity of gas made in 1897-8 was 504,639,000 cubic feet, or almost exactly the same as in the previous year. Of 472,723,300 cubic feet sold, 215,595,000 feet, or about 45 per cent., was delivered to large consumers at reduced rates. In 1876 only 124,770,000 cubic feet of gas was manufactured; and in ten years—*i.e.*, in 1886—this had not increased beyond 182,478,400 feet. The increase became marked in 1889-90, when it reached 246,330,000 feet; but since then the output, as already shown, has more than doubled.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The Paisley Gas Commission had a revenue last year of £42,176, an increase of £1490 upon the preceding year; and an expenditure of £34,239, an increase of £610. The balance at the credit of profit and loss account was £7937; but from this there fell to be deducted, £2155 as interest on mortgages, and £2748 carried to contingent account—leaving a net surplus of £2352. With the balance brought forward from the preceding year, there was a sum at the credit of profit and loss account of £7715. The accounts were presented to the Commissioners by Treasurer Mathieson at a meeting on Thursday, and were adopted; the price of gas being continued at 2s. 6d. per 1000 cubic feet. Everything is as it should be in the Corporation Gas-Works; and Mr. G. R. Hislop, the Engineer, deserves all the credit which can be given him, for efficient management. When, however, we get outside the range of his duties we find the pernicious principle in force of the appropriation of the surplus from the gas undertaking to Corporation purposes. This year £2000 has been applied to the reduction of the debt upon the Town Hall. There are 16,831 meters in use, which is an increase of about 700 during the year. The Works Committee recommended that prepayment meters be supplied, to a number not exceeding 500; the meters to be procured as they are required by the consumers. Treasurer Mathieson stated his disapproval of the proposal, on the grounds that the rate at which gas would be supplied would virtually amount to an annual meter rent of 4s. 7d. upon every meter, and he did not think there was sufficient slum population in Paisley to make the supply of prepayment meters a success. The Corporation, however, adopted the recommendation of the Committee.

The annual meeting of the Montrose Gaslight Company was held on Wednesday. The report of the Manager (Mr. T. Douglas Hall) stated that during the year 2710 tons of coal were carbonized, a decrease of 48 tons, when compared with the preceding year; but that from this quantity of coal 29,987,000 cubic feet of gas were produced, an increase of 840,000 cubic feet. The yield of gas per ton was 11,030 cubic feet, or 500 cubic feet per ton more than was obtained in the previous year. The gas supplied was of 25·22 candle power. Unaccounted-for gas amounted to 11·8 per cent., a decrease of 0·7 per cent. There were 63 prepayment meters in use, through which 374,700 feet of gas passed, the return being £89 13s. 5d.—an average of about 6000 cubic feet, and £1 8s. 6d. per meter. Seventeen gas-engines consumed 621,100 cubic feet; the return being £129 7s. 1d. The consumers numbered 2267, an increase of 26. Since the previous report, a set of four new purifiers, 15 feet square, by 4½ feet deep, had been erected, at a total cost of £947. They were set to work on the 6th of October last, and had given entire satisfaction. For the current year, it is hoped the cost of purifying materials will be considerably reduced, and it will be possible to send out gas free from impurities, which, with the old plant, it was at times difficult to do. The income, including a balance of £67 from the previous year, amounted to £5908, and the expenditure to £4512—leaving a surplus of £1396. A dividend at the rate of £2 10s. per share was declared, absorbing £1250; and the balance of £146 was carried forward. The Directors were re-elected, and so were the officials, which is a custom of the Company, and which, curiously enough, extends to Mr. Hall himself. There may be other instances, but I do not know of them, in which the Manager is elected year by year. It seems to be a useless ceremony, because, if a manager were not giving satisfaction (which is by no means the case here, for Mr. Hall was thanked for his services), he could be removed from office even though there were no yearly appointment. It is doubtless a rule of the Company, and I can suppose it to have originated in the methodical mind of the first Secretary of the Company, who, in all likelihood, was a lawyer, and was impressed with a sense of the magnitude, if not the risk, of the undertaking they were bringing into existence. I suppose the fortunes of a gas undertaking are about the best index procurable as to the state of trade in a town; and in this view it is pleasing to observe that Montrose seems to be in a flourishing way, and all the more so because within the past two years some industries in the burgh did not appear to be so prosperous as they might be.

The result of the past year's working of the Arbroath Corporation Gas Department is of more than ordinary interest. A year ago, in order to retrieve the harbour finances, an Act of Parliament was procured, which virtually annexed £250 a year out of the revenue from gas. It so happened that during the past financial year two payments of £250 fell to be made. Yet the gas revenue has borne it; and there is £16 over. The elasticity of the gas accounts was sufficient to bear an extra and unasked burden; but the wisdom, or otherwise, of raising money by this method for the relief of struggling local institutions, is made apparent by another peculiarity in the Arbroath Corporation Gas Act. By it one-half of the surplus upon the gas accounts goes to the Town Council, and the other half is placed to a consumers' account, to be used for the reduction of the price of gas. In the working of this fund, when it reaches £170 a reduction of 1d. per 1000 cubic feet is made. Now, there is £28 at the credit of the fund; and if the payments to the Harbour Board had not required to be made, and their amount had been placed to the consumers' account, there would have been a sum of £520, or thereabout, which would have enabled a reduction of at least 3d. per 1000 cubic feet to have been made in the price of gas. Yet the Corporation were unable to make any reduction, and have continued the price of gas at 3s. 11½d. It is not fair to Mr. Carlow that he should be obliged to make his own business prosperous, and should, under obligation to assist other bodies, be compelled to sell gas at a higher figure than is necessary. It is all very well so long as there is money in the gas account; but should it fail, or should the Corporation succeed in reducing it to the condition to which they have brought the harbour undertaking and the water supply—for, by the way, the gas undertaking is the only flourishing public body—whither are they to look next for help? They seem to be doing their best to cripple their most successful department. This is the principle to be applied to the situation. It is well for the public men of the town that, in practice, the gas undertaking has a back broad enough to carry all that they have hitherto put upon it.

The Corporation had their annual reports and accounts before them on Tuesday. The report of Mr. Carlow, the Manager, was as follows: The quantity of coal used during the year was 5865 tons, as against 5584 tons in 1896-97—being an increase of 280 tons, or 5·48 per cent. The make of

gas was 57,294,200 cubic feet, as against 54,597,200 cubic feet the previous year, which was an increased make of 2,697,000 cubic feet, or 4·93 per cent. In the past year the make of gas per ton of coal carbonized was 9768 cubic feet, which was a decrease of 8 cubic feet per ton, or 0·082 per cent., and the gas sold was 8764 cubic feet, which was an increase of 51 cubic feet, or 0·058 per cent. The unaccounted-for gas for the year 1896-97 was 9·2 per cent. of the quantity made; in the past year it was 8·731 per cent., which was a decrease of 0·469 per cent. The Finance Committee's report was given in by Mr. Sutherland, the Convener. It showed that for the year ending May 31 the revenue from gas amounted to £10,174, against £9632 for the previous year. From the chemical works a revenue of £976 was derived, against £1039 last year; the total receipts, including a sum of £250 set aside to meet the interest on the harbour subvention scheme, being £11,537. The expenditure was less by £16 than the revenue; leaving practically the same balance as for the previous year. The chemical works account showed that the total receipts last year amounted to £1937. The principal outlays were on wages (£115) and on sulphuric acid (£116). The balance in this department in favour of the Commissioners was £976, against £1038 the previous year. The accounts were approved of.

At a meeting of the Forfar Gas Corporation on Monday, an abstract statement of the accounts for the year to the 15th of June, 1898, was submitted. The revenue amounted to £6604, and was made up as follows: Balance from revenue account of year ending June 15, 1897, £900; gas rates (less discount, &c.), £4969; residual products, £734. The expenditure during the year amounted to £6385, showing a balance, being free revenue (subject to the payment of annuities), of £218. The principal items of expenditure were: Coal and carriage, £2770; retorts, bricks, and fire-clay goods, £210 (less re-sold and in hand, £104); new meters, £253 (less in hand, £129); wages, £895; interest, £269; management, £205; arrears written off gas rates, £154. The annuities payable on the 15th of July, 1898, amounted to £458; leaving a deficit on the year of £240. The sinking fund account showed a balance at its credit of £1330 standing against the works; and during the year there was paid for the redemption of annuities £219. The contingent fund account showed a credit balance standing against the works of £1201. Consideration of the accounts was delayed for a month; details regarding arrears having to be prepared in the meantime, at the request of one of the members. The price of gas is 3s. 9d. per 1000 cubic feet. The Corporation consider that they can continue at this rate; and it is possible they may. But it is open to observation that it is the lowest price charged for gas in any inland town in a wide district around. A deficit is, therefore, not so much to be wondered at; and a rise in price need cause no surprise. But why should there be so large an amount written off as irrecoverable? Had the £154 so dealt with been recovered, the deficit would only have been £86. The undertaking requires careful steering yet, before it can be said to have altogether recovered from the effects of the lethargic policy which was pursued down to a few years ago. At the same meeting, a letter was read from the gentleman who had tendered for the taking of the residual products, stating that the liquor was weaker than he anticipated, and reducing his offer by from 1s. 7d. to 1s. 9d. per ton of coal carbonized. This state of matters has directed the attention of the Corporation to the subject of erecting plant for the working up of residuals, which has been so successful at Arbroath and elsewhere; and the Commissioners are, during the current month, to inquire into the matter.

I observe workmen at last engaged in the work of preparing for the taking down of the giant chimney in the Edinburgh gas-works. They have erected a ladder up one side. As yet, they have got no further than to envelop the pillar with a multitude of ropes, and are busy upon a staging round the top, where the most difficult part of the work—the removal of the 32 tons of iron blocks which form the cap—is to be met with. The men on top look no larger than dolls.

Last year the Berwick and Tweedmouth Gas Company had an income of £5770, and an expenditure of £4575; and out of the net profit of £1194 a dividend at the rate of 10 per cent. has been paid.

A floating gasholder is not a thing unknown; but it is not like the ordinary gasholder, with which all are familiar. These holders are used for the conveyance of gas, under pressure, to the various buoys and lights in estuaries round the coast, in which gas is kept burning. It is announced to-day that the Northern Lights Commissioners have placed an order with Messrs. Hawthorns and Co., Limited, of Leith, for the building of a powerful twin-screw vessel for this service, to be placed upon the east coast. Such a service must be maintained at all costs; and where lights are in exposed situations, the boats which attend to them must be made sufficiently powerful to approach them, in an emergency, in almost any sort of weather.

Plans for the gas-works of the newly formed Monifieth Gaslight Company, have been prepared. They show works capable of producing 10 million cubic feet of gas per day. It is anticipated that they may be ready for the supply of gas during next winter. The plans were before the Dean of Guild Court on Wednesday. One of the members of the Court objected to his colleagues sitting, as they were shareholders in the Company; and he pointed to a clause in the Burgh Police (Scotland) Act, which provides that it shall not be lawful for any member of a Dean of Guild Court to sit when any matter in which he is personally interested is under consideration. The Clerk, however, explained that the restriction did not apply to a shareholder in a company, but only to a person sitting in judgment upon anything in which he had the sole interest. The objector left the Court; and the plans were then approved of, and warrant granted for the erection of the works.

In connection with the water supply of Ayr, a note of alarm has been more than once lately sounded by the authorities as to the extraordinary consumption of water. And there is surely ground for anxiety when the consumption reaches 83 gallons per head per day—undoubtedly the highest of any town in the kingdom. To hold a record is sometimes a creditable achievement; but it may be doubted if the town of Ayr has reason to be proud of this record. It may prove to be more expensive in the upkeep than the ratepayers may care for, if, as has been asserted, the enormous consumption of water in the district requires the laying of an additional pipe-line to the source of supply, and the construction of other supplementary works.

GAS AND WATER COMPANIES STOCK AND SHARE LIST.

Referred to on p. 136.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
590,000	10	Apl. 15	10½	Alliance & Dublin 10 p. c.	23½–24½	..	4 5 9
100,000	10	,,	7½	Do. 7 p. c.	16–17	..	4 8 3
300,000	100	July 1	5	Australian 5 p. c. Db. .	105–107	..	4 13 6
200,000	5	May 26	6	Bombay, Ltd. . . .	6¼–6⅜	+⅛	4 8 11
40,000	5	,,	6	Do. New, £4 paid .	4¼–5	..	4 16 0
380,000	Stk.	Feb. 24	12	Brentford Consolidated	280–285	..	4 4 3
240,000	,,	,,	9	Do. New . . .	215–220	+2½	4 1 10
50,000	,,	,,	5	Do. 5 p. c. Prf.. .	140–145	..	3 9 0
159,375	,,	June 10	4	Do. 4 p. c. Db. Stk.	130–135	..	2 19 3
220,000	Stk.	Mar. 30	11½	Brighton & Hove Orig..	268–273	..	4 4 3
318,820	,,	,,	8½	Do. A. Ord. Stk. .	195–200	..	4 5 0
933,500	Stk.	Feb. 24	5	Bristol, 5 p. c. max.. .	127–132	..	3 15 9
420,000	20	Ma . 30	11¼	British	53–55	..	4 1 9
50,000	10	Mar. 11	11½	Bromley, Ord. 10 p. c. .	25–27	..	4 5 2
75,000	10	,,	8½	Do. 7 p. c. .	20–22	..	3 17 3
600,000	10	Apl. 29	6	Buenos Ayres (New) Ltd	9–9¼	..	6 6 4
98,122	Stk.	June 29	4	Do. 4 p. c. Db. Stk.	98–100	..	4 0 0
150,000	20	July 14	8½	Cagliari, Ltd. . . .	30–31*	..	5 6 5
100,000	10	June 10	7	Cape Town & Dis., Ltd.	15–16	..	4 7 6
50,000	50	May 3	6	Do. 6 p. c. 1st Mort.	58–60	..	5 0 0
550,000	Stk.	Apl 15	13½	Commercial Old Stock .	315–325	..	4 3 1
200,750	,,	,,	10½	Do. New do. . .	252–257	..	4 1 8
200,750	,,	June 10	4½	Do. 4½ p. c. Db. do.	148–153	..	2 18 10
800,000	Stk.	June 10	12	Continental Union, Ltd.	207–212	..	5 13 2
200,000	,,	,,	9	Do. 7 p. c. Prf. .	195–200	+3	4 10 0
51,600	Stk	Feb. 24	14	Croydon A 10 p. c. . .	310–315	..	4 8 11
168,400	,,	,,	11	Do. B 7 p. c. . . .	255–265	..	4 3 0
535,000	Stk.	Feb. 24	5½	Crystal Palace Ord. 5 p c.	125–130	..	4 0 9
60,000	,,	,,	5	Do. 5 p. c. Prf. .	142–145	..	3 9 0
486,090	10	Jan. 27	11	European, Ltd. . . .	23½–24½	..	4 9 9
354,060	10	,,	11	Do. £7 10s. paid .	17–18	..	4 11 9
5,922,110	Stk.	Feb. 10	12½†	Gaslight & Coke, A, Ord.	297–302	..	4 1 1
100,000	,,	,,	4	Do. B, 4 p. c. max. .	120–125	..	3 4 0
665,000	,,	,,	10	Do. C, D, E, 10 p. c. Prf.	304–313	..	3 3 11
30,000	,,	,,	5	Do. F, 5 p. c. Prf. .	154–158	..	3 3 3
60,000	,,	,,	7½	Do. G, 7½ p. c. do. .	230–240	..	3 2 6
1,300,000	,,	,,	7	Do. H, 7 p. c. max. .	195–200	..	3 10 0
463,000	,,	,,	10	Do. J, 10 p. c. Prf. .	308–313	..	3 3 11
476,000	,,	,,	6	Do. K, 6 p. c. Prf. .	184–188	..	3 3 10
1,061,150	,,	June 10	4	Do. 4 p. c. Db. Stk. .	131–133	..	3 0 2
294,850	,,	,,	4½	Do. 4½ p. c. do. .	148–153	..	2 18 10
958,000	,,	,,	6	Do. 6 p. c. do. .	198–203	..	2 19 1
70,000	10	May 12	8	Hongkong & China, Ltd.	13½–14½	+½	5 10 4
3,800,000	Stk.	,,	10	Imperial Continental .	210–215	..	4 13 0
376,400	100	Feb. 1	4	Do. 4 p. c. Dbs. Red.	98–101	..	3 19 3
473,600	Stk.	Feb. 10	3½	Do. 3½ p. c. Db. Stk. ,,	103–106	..	3 6 0
560,000	100	Apl. 1	5	Met. of Mel- bourne 5 p. c. Db.	110–112	..	4 9 3
250,000	100	,,	4½	4½ p. c. Db.	107–109	..	4 2 7
75,000	5	June 29	6	Malta & Medn., Ltd. .	4⅞–5⅛	..	5 14 3
541,920	20	June 10	5	Monte Video, Ltd. . .	14–15	..	6 13 4
617,946	Stk.	Feb. 24	9¾	Newc'tle & Gatesh'd Con.	235–240	..	4 1 3
252,355	Stk.	Jan. 3	8½	Do. 8½ p. c. Db. Stk.	115–120	..	2 18 4
150,000	5	May 26	8	Oriental, Ltd. . . .	7¼–7⅜	..	5 8 3
135,000	5	,,	8	Do. New, £4 10s. pd.	6–6⅛	..	5 10 9
15,000	5	,,	8	Do. do. 1879, £1 pd.	1¼–1⅜	..	4 11 5
60,000	5	Mar. 11	7	Ottoman, Ltd. . . .	5–5½	..	6 6 2
500,000	100	June 1	6	People's Gas of Chicago 2nd M. Bd.	103–108	..	5 11 1
848,070	10	May 26	6	River Plate Ord.. . .	9–9½	..	6 6 4
250,000	Stk.	June 29	4	Do. 4 p. c. Db. Stk.	96–98	..	4 1 8
250,000	10	Apl. 29	10	San Paulo, Ltd. . . .	15½–16½	..	6 1 3
135,000	Stk.	Mar. 30	10	Sheffield A.	245–248	..	4 0 8
209,053	,,	,,	10	Do. B.	245–248	..	4 0 8
447,427	,,	,,	10	Do. C.	245–248	..	4 0 8
5,531,250	Stk.	Feb. 24	5½	South Metrop., 4 p.c Ord.	142–145	..	3 12 5
1,460,000	,,	July 14	3	Do. 3 p. c. Db. Stk. .	100–103*	..	2 18 3
60,000	Stk.	Mar. 11	12	Tottenham and Edmonton A. B.	285–295	..	4 1 4
60,000	,,	,,	9		205–215	..	4 3 9
182,380	10	June 10	7	Tuscan, Ltd.	12½–13½	−½	5 3 8
149,900	10	July 1	5	Do. 5 p. c. Dbs. Red..	100–103	..	4 17 1
				WATER COMPANIES.			
746,164	Stk.	June 29	10½	Chelsea, Ord.	313–318	..	3 6 0
150,000	,,	,,	5	Do. 5 p. c. Prf. . . .	170–175	..	2 17 2
160,000	,,	,,	4½	Do. 4½ p.c. Pf. Stk., 1875	148–152	..	2 19 3
175,785	,,	Mar. 30	4½	Do. 4½ p. c. Db. Stk. .	157–162	..	2 15 7
1,720,560	Stk.	Apl. 15	8	East London, Ord. . .	227–232	+2	3 9 0
654,740	,,	Ju e 29	4½	Do. 4½ p. c. Db. Stk.	157–160	..	2 16 3
390,000	,,	,,	3	Do. 3 p. c. Db. Stk..	103–105	..	2 17 2
700,000	50	June 29	7½	G'd Junct'n, 10 p. c. max.	115–118	..	3 3 7
310,000	Stk.	Mar. 30	4	Do. 4 p. c. Db. Stk.	140–145	..	2 15 2
708,000	Stk.	Feb. 10	13	Kent	360–365	..	3 11 2
160,000	,,	,,	7	Do. New, 7 p. c. max..	213–218	..	3 4 3
1,043,800	100	June 29	10	Lambeth, 10 p. c. max..	298–303	..	3 6 0
406,200	100	,,	7½	Do. 7½ p. c. max..	227–232	+2	3 4 8
350,000	Stk.	Mar. 30	4	Do. 4 p. c. Db. Stk.	140–145	..	2 15 2
500,000	100	Feb. 10	13	New River, New Shares	432–437	..	2 19 6
1,000,000	Stk.	Jan. 27	4	Do. 4 p. c. Db. Stk.	141–146	..	2 14 10
902,300	Stk.	June 29	6	Southw'k & V'xhall, Ord.	163–168	..	3 11 5
126,500	100	,,	6	Do. do. 7½ p. c. max. .	155–160	..	3 15 0
489,200	Stk.	,,	5	Do. do. 5 p. c. Prf. .	168–172	..	2 18 2
1,019,585	,,	Apl. 15	4	Do. 4 p. c. A Db. Stk.	141–144	..	2 15 7
1,155,066	Stk.	June 10	10	West Middlesex . . .	297–302	..	3 6 3
200,000	,,	,,	4½	Do. 4½ p. c. Db. Stk.	162–165	..	2 14 7
200,000	,,	Mar. 11	8	Do. 8 p. c. Db. Stk.	104–106	..	2 16 7

* Ex div.

† Next dividend will be at this rate.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *July* 23.

Sulphate of Ammonia.—The greater activity in the market referred to in the last report has been continued throughout the week, at advancing prices; and the closing quotations are £9 7s. 6d. to £9 10s. per ton f.o.b. at the ports. The bulk of the purchasing has again been for covering sales for July delivery; and some difficulty has been experienced in securing supplies. Consumers have only bought a limited quantity; for the most part they have held back, on the chance of doing better later. In the forward position, too, there has been more doing; and £9 10s. per ton f.o.b. Leith has been paid for July-December delivery. Beckton quotations have been advanced to £9 10s. July-September; to £9 7s. 6d. October-December; and £9 10s. is now quoted for January-March, 1899, delivery—all Beckton terms.

Nitrate of Soda is a shade firmer on spot; and 7s. 6d. per cwt. is the quotation for fine quality.

LONDON, *July* 23.

Tar Products.—There is no improvement in this market, which is as quiet as it well can be. Benzols are neglected and weak; both 90's and 50's being quoted at the same price. The value of pitch is maintained; but no business is being transacted—the shipping season being now closed for some weeks. Creosote is said to be scarce; and in some localities higher prices than those quoted below are obtained. The speculative element, notwithstanding disastrous past experiences, seems to still exist among some tar distillers, as one or two contracts have recently been let at several shillings above their actual value. The outlook of products does not warrant any sanguine anticipations of better prices for some time; and, on the face of it, it seems foolish to pay more money for raw material than the position warrants.

The average quotations for the week are: Tar, 12s. to 15s. Pitch, east coast, 23s. 6d.; west coast, 19s. Benzols, 90's and 50's, nominal, 10d. Toluol, 1s. Solvent naphtha, 1s. 2d. Heavy naphtha, 1s. 1d. Crude, 30 per cent., naphtha, 4¼d. Creosote, 2¼d. to 2¾d. Heavy oils, 42s. 6d. Carbolic acid, 60's, 2s. Naphthalene, 52s. 6d.; salts, 30s. Anthracene, nominal, "A," 4½d.; "B" 3½d.

Sulphate of Ammonia.—A decided improvement has taken place during the last two or three days; and buyers are willing to pay a little more money for prompt delivery, and at one or two ports for forward also. A large business is reported, and heavy shipments are being made. Most makers are well sold; and the article is undoubtedly scarce. It is stated that the higher values of sulphate are influencing nitrate. If this be so, it is the first time it has ever done so, and is truly an illustration of the "tail wagging the body." Values may be averaged at from £9 6s. 3d. to £9 8s. 9d., less 3½ per cent., in all positions.

Brynmawr and Blaina Gas Company.—At the meeting of the Directors of this Company held on the 21st inst., it was decided to pay the maximum dividend (10 per cent) for the half year ended the 30th of June. The Board considered this highly gratifying, in face of the coal strike.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—A slow but steady business in house-fire qualities, with an active inquiry for other descriptions of fuel, and prices firm, is the general position throughout the coal trade of this district. The better sorts continue in more than average request for the time of year; and though some of the house-fire coal-pits have had to go on short time, the average working, taking it all through, is not much less than four to five days per week. Prices, for the most part, are maintained on much the basis of last winter's rates. The lower classes of round coals are in a decidedly strong position. For steam and forge purposes the inland demand is brisk; and requirements for shipment continue more than sufficient to take away any surplus supplies that collieries may have to offer. At the pit mouth, best Wigan Arley coals remain steady at 10s. to 10s. 6d. per ton; with Pemberton four-feet and seconds Arley ranging from 8s. up to about 9s. in special cases, and common round coals, from 7s. up to 7s. 6d. per ton. With regard to round coal contracts, colliery proprietors are holding firmly for advances over last year's rates, averaging 6d. per ton as the minimum to 9d. per ton in some cases. For shipment, good ordinary steam coals are fetching 8s. 6d. to 9s. per ton delivered at the Mersey ports. In exceptional cases 9s. to 9s. 3d. per ton is quoted; but large buyers are very cautious about entering into engagements where anything above what may be termed the ordinary average prices is asked. In gas-making coals there is no specially new feature to notice; contracts in these being generally placed on pretty much the basis previously reported. At the pit mouth ordinary gas coals, such as Wigan four-feet, average 6s. 9d. to 7s. 3d. per ton; and good screened Arley gas coals, 7s. 9d. to 8s. 3d. Though there is no general scarcity of slack in the market, supplies being plentiful in some of the outside districts, many of the Lancashire collieries are short; and in not a few cases quotations have been advanced 3d. per ton. Except, however, on forward contracts, or in special cases, advanced rates are not being readily obtained; but the general quotations at the pit mouth may be given at 3s. 6d. to 3s. 9d. per ton for common, 4s. to 4s. 3d. for medium, and 4s. 6d. up to 5s. for the best qualities of engine fuel.

Northern Coal Trade.—There has been a fuller trade in coal; and prices have been higher, owing to the relative scarcity of coal, both steam and gas. The continuance of the strike in South Wales, and the occurrence of local holidays have made the demand temporarily in excess of the supply, and to ensure supplies higher prices have had to be paid in many cases. Best Northumbrian steam coals are generally quoted at 13s. 6d. per ton f.o.b.; but there have been sales as high as 14s. Second class steams are about 12s. 9d. per ton f.o.b.; while steam smalls have risen to 6s. per ton. Household coals are very dull, as is usual in weather so warm. Bunker coals have been scarce, and have sold as high as 10s. 6d. per ton f.o.b., while the usual price ranges from 9s. 6d. to 10s. 3d. per ton. In the gas-coal trade there has been a strong demand, and for occasional cargoes 10s. 6d. to 11s. per ton f.o.b. have been paid; while one large producer of best Durham gas coals has asked 12s. per ton. The quantities of gas coals sent to the Metropolis have been very large;

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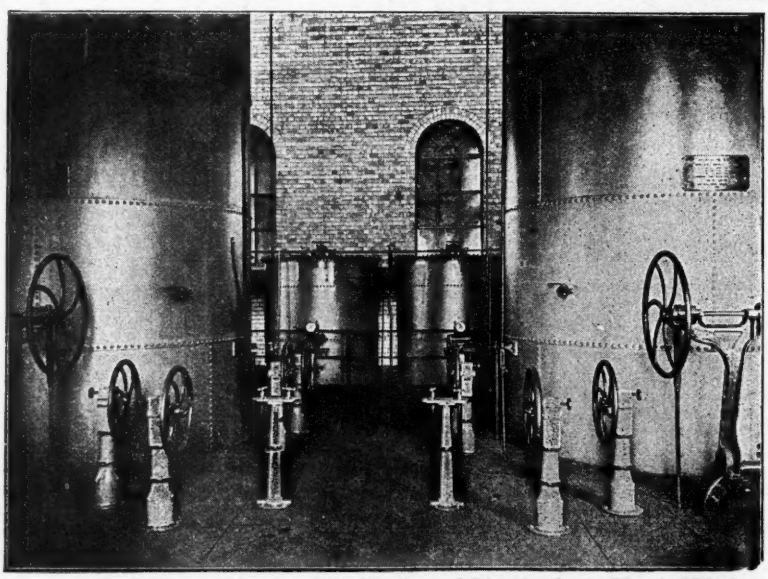


RESULTS PROVE EFFICIENCY.

Working Floor of Generator House. One Quarter Section of Birmingham Plant, Windsor Street Station.
The Maximum Daily Capacity of the Birmingham Corporation's Plant, which was erected by this Company, is 10 MILLION CUBIC FEET.

and the gas cooking and heating stoves have raised considerably the consumption of gas in many of the local towns, and have thus made the use of gas coal much larger than is generally the case at this season of the year. There is very little alteration in the demand for manufacturing coals; but the price is firm, and new contracts are at rather higher rates. In coke, the market is very firm, and the article is rather scarcer in both kinds. Gas coke is being produced in comparatively limited quantities; and stocks are only moderate, except in some of the inland towns. Prices are unaltered this week.

Scotch Coal Trade.—Trade is still in an inanimate condition, on account of the miners being idle. Inquiries are being made for delivery during August; and the prices quoted are: Main, per ton, f.o.b., Glasgow, 8s. 9d. to 9s.; ell, 9s. 6d. to 9s. 9d.; and splint, 9s. 6d. to 9s. 9d. The shipments for the week were 227,940 tons—a decrease upon the preceding week of 19,250 tons, but an increase upon the corresponding week of last year of 55,407 tons. For the year to date, the total shipments have been 4,983,184 tons—an increase upon the corresponding period of last year of 883,646 tons.

The London County Council and Gas Testing.—The Public Control Committee of the London County Council have reported that, in consequence of the Metropolitan Gas Referees having prescribed a new standard for testing the illuminating power of gas, it is necessary that a new portable photometer and standard pentane lamp should be obtained of the description notified by the Referees. The *agenda* for the meeting of the Council to-day contains a recommendation that a new photometer and lamp should be procured of Messrs. Alexander Wright and Co.

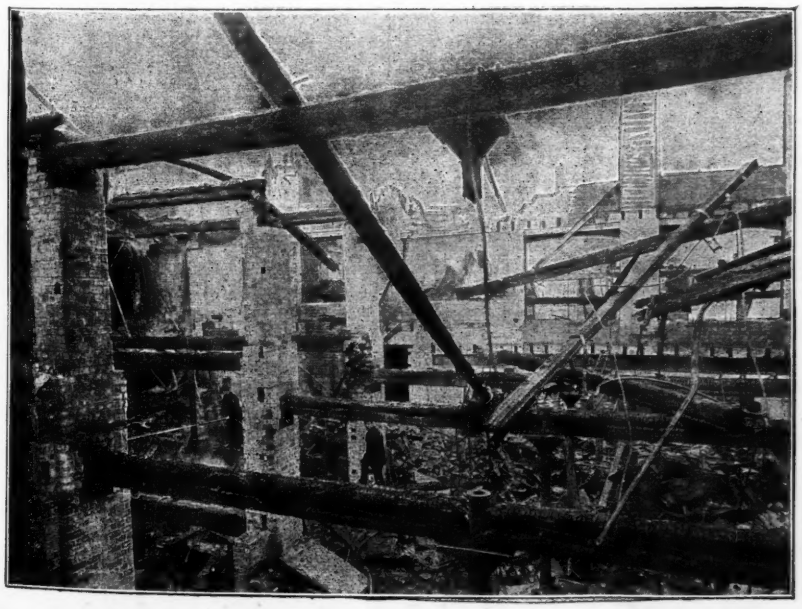
Reduction in Price.—The Directors of the Cannock, Hednesford, and District Gas Company have reduced the price of gas in the Hednesford district from 4s. 2d. to 3s. 9d. per 1000 cubic feet as from the 1st inst., with discounts of 5, 10, and 15 per cent. for consumptions above 25,000 and up to 200,000 cubic feet per quarter, 20 per cent. beyond this, and 30 per cent. for gas used in engines, if accounts are paid within one month of each quarter day. These prices are the same as those charged at Cannock. The Directors have also decided to charge 5d. per 1000 cubic feet less for all gas used for cooking and heating purposes. This is the second reduction in eighteen months, or a total of 10d. per 1000 cubic feet since the amalgamation of the undertakings.

Extensions at the Saltley (Birmingham) Gas-Works.—The members of the Birmingham Corporation Gas Committee, including the Lord Mayor and the Chairman (Alderman Pollack), last Friday inspected the extensions which are being made at the Saltley Gas-Works. The visit was an interesting one; and the Committee expressed satisfaction at the progress that is being made with the work. To the No. 5 gasholder two additional lifts are being added, thereby increasing its capacity from 2 million to 4 million cubic feet. The guide-framing is being extended for one lift; but the fourth lift will run above the top of the framing. A new holder is being constructed which will have a capacity of 8¼ million cubic feet. It will be 264 feet in diameter and 42 feet deep, and will have four lifts, to three only of which the guide-framing will extend.

The Filey District Council and the Gas and Water Works.—Opposition to the further progress of the Filey Water and Gas Bill has been withdrawn; and the proposed purchase of the undertaking of the Filey Water and Gas Company by the District Council is in course of completion. The price is to be about £55,000. The original offer of the Council was the maximum dividend for 20 years, and 28 years' purchase for the shares. This was declined, as was also a subsequent offer amounting to £47,000.

Explosion at the Plymouth Gas-Works.—An explosion (of which somewhat exaggerated reports have appeared in the local papers) occurred at the Plymouth Gas-Works last Tuesday evening, causing slight injury to five persons. It appears that a temporary obstruction took place in the water-gas plant which has been in continuous operation for the last six months. Gas making was at once stopped; and, after taking due precautions to clear the apparatus of gas, the cover of the bottom manhole of the scrubber was removed. Subsequently, a slight explosion took place; and the resulting flame burnt Mr. Ernest Cutler (who was visiting the gas-works, where Messrs. Cutler and Sons are at present engaged in laying down duplicate sets of the apparatus) and four workmen. Mr. Hoyte, the Assistant Manager, who was in charge of the works during the temporary absence of Mr. A. Wharton, the Manager, rendered such aid as he could until the arrival of the doctor, under whose direction Mr. Cutler and two of the men were removed to the hospital, where, as since reported, they are progressing favourably. The other two men were able to proceed to their homes. No damage was done to the plant; and the only effect in the building which contains the apparatus was the breaking of a few panes of glass. Gas making was resumed a few hours afterwards.

Sales of Stock and Shares.—On Monday last week, Mr. Alfred Richards offered for sale, at the Mart, Tokenhouse Yard, £15,000 of new stock (1881) of the Brentford Gas Company, by order of the Directors. It ranks for a dividend of 7 per cent., subject to the sliding-scale; but the last dividend on similar stock was at the rate of 9 per cent. per annum. The highest price realized was £215 per £100, at which figure a good deal of the stock was purchased; the lowest price was £203—the average being £208 16s., which returned £4 6s. 3d. per cent. on the investment. There was a good deal of competition for the stock. On the following day, Mr. C. A. Joel sold, at the offices of the Newcastle and Gateshead Water Company, £40,000 of 5 per cent. preference stock of the Company, under the provisions of their Act of 1894, at prices ranging from £165 to £172 per £100 of stock. On the same day, ten fully-paid shares in the Needham Market Gas Company were sold at £11 7s. 6d. each; five similar shares realizing £11 5s. apiece. In accordance with the announcement which recently appeared in the "JOURNAL," Messrs. J. M. Leeder and Son offered for sale by auction last Friday, at the Royal Hotel, Swansea, £20,000 of new ordinary stock of the Swansea Gas Company; being part of the additional (5 per cent.) capital authorized by the Company's Act of the present session. The new capital is required for carrying out the coin-meter system in the district, extending the works, &c. The highest price paid per £100 of stock was £124 10s.; the lowest, £123 10s.—the average being £123 12s. 4d—a total of £24,723 1[illegible].



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Northampton Corporation Water Department.—The Borough Accountant of Northampton (Mr. S. Hull) shows, in his abstract of the accounts for the year ending March 25, that on the revenue account of the Water Department there was a balance of £18,035. This has been carried to the net revenue account, which, however, discloses a balance of £2926 due to the general district rate. The receipts on capital account total to £343,791; and on the date named there was a balance of £2177.

Reading Water Supply.—At the last meeting of the Reading Town Council, it was decided to adopt a special report presented by the Water Committee setting forth details for an extension of the water-works, for which preliminary plans have been prepared by the Water-Works Manager (Mr. A. T. Walker). It is proposed to construct a reservoir on high land in the parish of Tilehurst, and connect it with the existing works. Additional pumping power may eventually be required at the Bath Road works for raising the water to the proposed new reservoir; and this it is proposed to supply, when the proper time arrives, by means of Worthington engines of the same type as the existing ones. The total cost of the works above indicated is estimated at £45,000; but the Committee state that it will probably not be necessary to incur more than £30,000 of the estimated expenditure for many years to come.

Morpeth New Water-Works.—New water-works for Morpeth are nearing completion at Tranwell; and the Engineer (Mr. Dinning) has reported to the Council on the yield of water. He says that he finds the delivery from the boreholes averages 85,000 gallons of pure spring water every twenty-four hours. During fifteen or sixteen hours of the day, the quantity is below the demand; and during the other hours of the night, it is in excess—the deficiency during the height of the day being made up by drawing from the storage reservoirs. By constructing a chamber to hold 36,000 gallons, in which to store the water running to waste during the night, the water from the springs would, the Engineer remarks, be sufficient to supply all the needs of the town even during those hours when the demand is greatest. Such a chamber could be made for £200. The Council have, however, decided to conclude the present contract before entering on any additions.

The High-Level Water Supply of Bradford.—In submitting the usual monthly statistics as to the condition of the water supply at the last meeting of the Bradford City Council, Alderman Holdsworth made a statement which shows that the consumption of water on the high level at the present time is nearly as large as on the low level; and this has been the state of things for at least a month. Taking into consideration that the quantity of storage in the low level is five times that in the high level, the position is somewhat serious. Notwithstanding that the Corporation have more water than last year, they are worse off. They have no water to pump to the high level, because the conduits only carry what is sufficient for the low level. It is hoped that in a few months the Barden reservoir will be made into a high-level storage reservoir. In the meantime, matters are strained; and it is just a question whether it will not be necessary in the course of a week or so to put the whole city on short supply.

Westbury Water Supply.—At the last meeting of the Westbury (Wilts.) District Council, the Clerk reported that the Local Government Board had sanctioned the borrowing of £8000 for works of water supply for the parishes of Westbury and Dilton March. The Board had made several concessions as to protective area, which practically limited the restriction to 39a. 2r. 31p. belonging to Lord Ludlow, and a small portion of Sir Massey Lopes' land inside the purchase area. The total effect of the concessions made would mean a saving of about £25 a year. The Chairman (Mr. J. S. Whitaker) said the Council were indebted to Lord Ludlow for his action in respect to the Local Government Board, and also for reducing his price to 10 guineas. He proposed that the thanks of the Council be conveyed to his Lordship; and also to the Clerk, for the energy he had shown in pushing the matter forward. The propositions were unanimously carried.

Water-Works for Kirkby-in-Ashfield.—Under a contract entered into some ten years ago, the Sutton-in-Ashfield District Council have furnished water to Kirkby-in-Ashfield; but the inhabitants have been dissatisfied with the supply both in respect to its quantity and quality. The District Council have therefore decided to have works of their own; and they have adopted a scheme propounded by Mr. Radford, of Nottingham. The cost is estimated at £9200; and an application to borrow this sum was the subject of a Local Government Board inquiry last Tuesday. The evidence given by Mr. Radford showed that it was proposed to sink a well, which he estimated would provide a minimum supply of 300,000 gallons per day; but it was proposed at present to make provision for only 150,000 gallons. The quantity now taken from Sutton-in-Ashfield was 93,000 gallons. At the conclusion of the inquiry, the Inspector visited the chief places concerned, and promised to report in due course.

The County Council's Parliamentary Expenses.—The Parliamentary Committee of the London County Council report that their expenditure during the year ended March 31 last, in connection with the promotion of, and opposition to, Bills in Parliament, exceeded the amount of their annual estimate by £2334. In asking the Council to sanction the excess, they point out the extreme difficulty experienced in estimating probable parliamentary expenditure. The heaviest expense was incurred when contests took place before Select Committees of Parliament; and at the time of forming the estimate, it was absolutely impossible to say in which cases such contests would take place, or in which they might be avoided by arrangement. Their estimate of expenditure was originally £19,000; but it was reduced to £10,000 in consequence of the rejection of the Council's Water (Purchase) Bills. A considerable sum was, however, spent before this took place. The Southwark and Vauxhall Water Company's Bill, introduced late in the session, and not contemplated at the time the estimate was made, largely contributed to the excess expenditure. The Council's opposition to the New River and East London Water Bills, among numerous others, led to a good deal of expense; and the estimate was further drawn upon in respect of small amounts in connection with the promotion of the Council's Private Bills of the present session.

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Explosion in a Tunnel.—According to a telegram received through Reuter's Agency, ten persons have been killed by an explosion, reported to have been caused by gas, which occurred in a large tunnel in process of construction under Lake Erie in connection with the water-works there. The bodies were lying about 6000 feet inside the tunnel. A rescue party penetrated for a distance of about 5000 feet, but were compelled to return. They are said to have found the bottom of the tunnel covered with "a peculiar substance resembling snow."

The Quality of London Water in June.—The report of Sir William Crookes, F.R.S., and Professor Dewar, F.R.S., on the composition and quality of daily samples of the water supplied to London for June states that, of the 182 samples of water collected by them during the month from the mains of the London Water Companies taking their supply from the Thames and Lea, all were found to be clear, bright, and well filtered. During the month, the London waters were of high dietetic quality. The number of microbes in the supply was generally low, with the exception that on June 6 a sudden increase of harmless microbes took place in all the Companies' waters. The fact that this anomaly occurred simultaneously in all the filtered waters suggested that it was due to some general cause which at present remains unexplained.

Hoylake and West Kirby Gas and Water Company, Limited.—The report which the Directors of this Company will present at the ordinary general meeting next Friday shows that in the year ending June 30 last the net revenue from the sale of gas was £1532, from the sale of water £2335—together, £3867. Adding the balances brought forward, amounting to £51, there is produced a total of £3918. Deducting the interim dividend (£1583) paid in January, there is a sum of £2335 available for distribution; and the Directors recommend dividends of 7 and 5¼ per cent. on the gas, and of 4¾ and 3 13/16 per cent. on the water capital. These will absorb respectively £978 and £1228—together, £2206—leaving £129 to be carried forward. If the recommendation is adopted, the dividend for the year will be 11 and 8 per cent. on the gas, and 8¾ and 6⅛ per cent. on the water capital.

Wellington (Somerset) Gas Company.—The accounts of the above-named Company for the year ending June 24 show that the receipts amounted to £3435 (gas and meter rents being £2460); the expenses to £2213—leaving a balance of £1222. This has been disposed of as follows: Dividend at the rate of 9 per cent., £810; placed to the reserve fund, £400; carried forward, £12. According to the working statement of the Manager (Mr. P. Thomas), the quantity of coal and cannel carbonized was 1352 tons, the average cost of which was 17s. 11d. per ton, as compared with 18s. 2¾d. in the preceding year. The gas made per ton of coal was 10,780 cubic feet, of which 10,316 cubic feet were sold, against 9894 cubic feet before; the quantity accounted for being 96 61 per cent. of the make, as compared with 96·10 per cent. in 1896-7. The paid-up capital is £9000; being £6 13s. 1d. per ton of coal carbonized, and 12s. 10d. per 1000 cubic feet of gas sold, at the price of 3s. 9d.

Pressure Water Supplies in the City.—The County Purposes Committee of the Corporation have, at the instance of Mr. A. C. Morton, been considering the question of the water supply as it affects the rights of the ratepayers of the City in respect of a pressure water service, by meter or otherwise, and a constant supply. They have elicited from the New River Company an assurance that, while they do not regard pressure supplies as falling within the usual scope of their business, in cases in which a consumer is particularly desirous of such a service his wish is met so far as possible, provided the pressure under which the ordinary supply is maintained is not thereby prejudiced. With regard to a constant supply, the Company were perfectly willing to give such a supply if called upon to do so, provided the regulations prescribed by the Metropolis Water Act, 1871, were previously complied with. Up to the present the Corporation have not thought it expedient, in the interests of the citizens, to take any steps in the direction indicated for a constant supply.

A Water Scheme for the Chesterfield Rural District.—The inadequacy of the water supply in the northern part of the area of the Chesterfield Rural District Council (embracing such populous townships as Staveley, Eckington, Dronfield, Poolsbrook, and Killamarsh) has for a long time been the subject of constant complaint and discussion. It is hoped, however, that a different state of things will soon prevail; for a large scheme to augment the supply, estimated to cost £54,000, has been prepared by Mr. E. M. Eaton, of Sheffield. Application has been made to the Local Government Board for sanction to borrow the money required to carry it out. In the meantime, Mr. Frith, the local Engineer, is most indefatigable in his endeavours to cope with the difficulties with which he is beset; and only a few days since, with the aid of a Deacon's waste-water meter, he succeeded in detecting a leakage of about 5000 gallons per hour in the Dronfield parish. Since this defect was remedied, some of the higher portions of the district have received the luxury of a supply. The ratepayers in the southern portion of the Council's area are more happily circumstanced; and the undertaking of the Ashover Water Company has recently been purchased for £1800 to still further augment the supply.

Cost of Water for Roads at Wigan.—The Mayor of Wigan (Alderman Richards) has raised a question which will perhaps interest other bodies supplying water besides the Corporation of which he is the head. During the year ended March last, the consumption of water in the borough had increased, but the receipts were reduced by £35, as compared with the year 1896-7; and the Mayor, who is Chairman of the Water Committee, was asked to explain this. He did it very easily, by showing that more water had been used for which no payment was made. If Water Departments are to be free from this curious feature of increased consumption and decreased receipts, there must, as the Mayor of Wigan has hinted, be a change in the mode of supplying the water. Thus twenty years ago the sum of £60 per annum was fixed as the price for watering the streets of Wigan. But many miles of new streets have been opened in the town—thereby causing the consumption of more water; but there has been no increase in the price. What the Mayor of Wigan suggests is that where water is supplied gratuitously, the value of it should be included in the receipts of the Water Department, and that the water used on the streets and in the baths should be differently charged. The Water Department should, in fact, be carried on on strict business lines; getting value, in some way, for all water supplied.

JOSEPH AIRD
GREAT-BRIDGE,
STAFFORDSHIRE.
HIGHEST QUALITY
TUBES AND FITTINGS
GAS, STEAM, WATER, GALVANIZED TUBES and FITTINGS in all Sizes.
LARGE TUBES FOR COLLIERIES.
Illustrated Price Lists on Application.
LONDON OFFICES: 46, QUEEN VICTORIA STREET, E.C.

The Payment of Gas Accounts at Bolton.—As several gas consumers of Bolton have lost their discount through overlooking the date when payment of their accounts was due, a Sub-Committee of the Gas Committee were appointed last April to consider and report upon a scheme for notifying to consumers the latest time for settlement. At a recent meeting of the Gas Committee, they recommended that a notice be inserted in the local newspapers during the period in which the accounts have to be paid, calling attention to the last day for payment; and the recommendation was adopted by the General Committee.

Kidderminster Water Supply.—The Kidderminster Corporation Water Committee, finding it impossible to maintain a constant water supply during the summer months, recommended the Council last Wednesday to sink a new well and borehole. The remarks of the Chairman of the Water Committee (Alderman Smith) showed that the health of the inhabitants demanded that some steps should be immediately taken for augmenting the supply, besides which the engines at one of the works were old and worn out, and might break down at any time. The recommendation was adopted.

The Lighting of Menston.—On Monday last week, at Menston, Mr. Henry Law, M.Inst.C.E., conducted an inquiry, on behalf of the Local Government Board, into the application of the Menston Parish Council for permission to borrow £200 for the purpose of lighting the streets with gas. The Council were represented by Mr. J. Clayton (Chairman of the Lighting Committee) and Mr. R. Davey (Clerk); Mr. Hankinson representing the West Riding County Council. Mr. Clayton stated that the money it was desired to borrow was for the purchase of eighty lamps, gas for which would be supplied by the Yeadon and Guiseley Gas Company at a cost of 3s. 1½d. per 1000 cubic feet to private consumers, and of 2s. 8½d. for public lighting. It was requested that the loan might be extended over a period of ten years, as it would then involve only an additional 2½d. in the pound on the rates. Gas-pipes were already laid in most of the houses, and few additional mains would be required.

The Carlisle Water Scheme.—Our readers are aware that the Carlisle Corporation have a Bill in Parliament to enable them to obtain an additional supply of water and construct new works. It has been opposed up to now by Lord Carlisle and the Brampton Rural District Council; but an arrangement has been come to whereby the Bill will be allowed to proceed. The principal terms are as follows: (1) The Corporation are to supply the Brampton Council with such quantity of filtered water as the district requires, not exceeding 220,000 gallons per day—100,000 gallons at Faugh, and 120,000 gallons at Garthhead, free; the Council paying £500 towards the cost of pumping, and obtaining the necessary easements and authorities for laying a pipe between the reservoir and their tank free of cost to the Corporation. (2) In the event of Brampton not carrying out the scheme, the Corporation are to supply Lord Carlisle with such quantity of water as may be required for his estate, not exceeding 80,000 gallons, delivered into his tank at Garthhead; his Lordship obtaining the necessary easements free of cost to the Corporation. (3) The minimum flow to remain as decided by the Lords' Committee; also the gauge.

The Anglo-Caucasian Oil Co., Limited, intimate the removal of their London Office to 8, 9, 10, 11, Lime Street, E.C. as from the 22nd inst.

Messrs. C. & W. Walker, of the Midland Iron-Works, Donnington, are removing their London Offices from Finsbury Square to 110, Cannon Street, E.C.

BANK HOLIDAY.

NOTICE TO ADVERTISERS.—In consequence of the **BANK HOLIDAY**, Aug. 1, orders with respect to **ADVERTISEMENTS** should be received at the Office *not later* than **THE FIRST POST ON SATURDAY NEXT.**

GAS PURIFICATION AND CHEMICAL COMPANY, LIMITED.

OXIDE OF IRON.

O'NEILL'S Oxide has a larger annual sale than all other Oxides combined. Purity and uniformity of quality guaranteed.

JOHN WM. O'NEILL, Managing Director,
160, 161, & 162, PALMERSTON BUILDINGS,
OLD BROAD STREET,
LONDON, E.C.

ANDREW STEPHENSON, AGENT. All communications *re* Oxide to the Company as above.

WINKELMANN'S "VOLCANIC" and "VOLCUM" CEMENT. Fire Resistance up to 4500° Fahr. In use in Gas-Works all over the World.

ANDREW STEPHENSON,
182, PALMERSTON BUILDINGS,
OLD BROAD STREET,
LONDON, E.C.

Telegrams: "*Volcanism, London.*"

SULPHATE OF AMMONIA SATURATORS.

JOSEPH TAYLOR & CO., Chemical Plumbers, &c., and Makers of every description of Solid Plate Lead and Timber Cased Saturators, &c., CENTRAL PLUMBING WORKS, TOWN HALL SQUARE, BOLTON. Special attention to Repairs.
Before placing Orders, please write for Estimate.
Telegraphic Address: "SATURATORS, BOLTON."

J. & J. BRADDOCK, Globe Meter Works, Oldham.
First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.
Telegraphic Address: "Braddock Oldham."

SULPHURIC ACID.

JOHN NICHOLSON & SONS, Limited, Chemical Works, Leeds, specially produce this ACID from SULPHUR, for making SULPHATE OF AMMONIA of high quality and *good* colour. Delivery in our own Railway Tank-Wagons or Carboys. Highest references and all particulars supplied on application.

PORTER & CO., Gowts Bridge Works, LINCOLN, Engineers, Ironfounders, and Contractors for the erection of Gas-Works for Towns, Villages, Mansions, Manufactories, Collieries, and Isolated Buildings at home and abroad. Manufacturers of Retorts and Fittings, Condensers, Scrubbers, Purifiers, Valves, &c.; also of Girders, Wrought and Cast Iron Tanks, Iron Roofs, &c.
Telegraphic Address: "PORTER LINCOLN."
[For Illustrated Advertisement, see July 5, p. 73.]

NEW GAS PLANT CEMENT.

JOHN E. WILLIAMS AND CO.,
VICTORIA PAINT WORKS,
MANCHESTER.
For all Joints in connection with Oil-Gas Plant and Sulphate Plant.
For all Gas Joints.
For all Tar Joints.
For all Ammonia Joints.

GAS PURIFICATION.

OXIDE OF IRON BOG ORE.

BALE & CO.'S Oxide of uniform quality. SPECIAL FIRE CEMENT, OXIDE PAINTS OILS, SULPHURIC ACID, &c.
120 and 121, NEWGATE STREET, LONDON, E.C.
Telegrams: "BOGORE, LONDON."

BROTHERTON & CO.
Offices: Commercial Buildings, LEEDS.
Correspondence invited.

HYDRATED OXIDE OF IRON.

PREPARED from pure Iron.
Two or three times as rich as Bog Ore.
Strong action on Sulphuretted Hydrogen.
To be used alone, but will increase activity of other Oxides.
Less than half the price of Bog Ore.
Can be lent on hire.
Write for tabulated results.
READ HOLLIDAY AND SONS, LIMITED, HUDDERSFIELD.

TO GAS AND WATER OFFICIALS.

SPECIALLY favourable terms for Cycles. First-Class Workmanship and Material guaranteed. Art Catalogue post free.
MELROSE CYCLE COMPANY, COVENTRY.

AMMONIACAL LIQUOR wanted.
BROTHERTON AND CO., Ammonia Distillers.
Works: BIRMINGHAM, LEEDS and WAKEFIELD.

GWYNNE & BEALE'S

PATENT

GAS-EXHAUSTERS AND STEAM-ENGINES

FOR FULL PARTICULARS, APPLY TO THE MAKERS:

GWYNNE & CO.,

Telegrams:
"GWYNNEGRAM, LONDON."

HYDRAULIC AND GAS ENGINEERS

Telephone
No. 95 Holborn.

(Late Essex Street Works, Victoria Embankment, London),

BROOKE STREET WORKS, HOLBORN, LONDON, E.C.

TUBES for Gas, Steam, and Water (all Sizes) Welded or Riveted. TANKS, HYDRAULIC MAINS, RETORT-LIDS, &c.
JOHN SPENCER, Globe Tube Works, WEDNESBURY; and 14, Great St. Thomas Apostle, LONDON.

HUTCHINSON BROTHERS, Gas Engineers, &c., Falcon Works, Barnsley, Makers of Wet and Dry Gas-Meters, Brass-Work, and general Gas Apparatus, Lead Saturators, Tanks, &c., Tools, and Gas-Works Sundries. (See p. 178, last week's issue.)
Telegrams: "HUTCHINSON BROS., BARNSLEY."

SADLER & CO., Ld., Middlesbrough; ULVERSTON (BARROW); PORTSMOUTH; CARLTON (N.E.R.); and STOCKTON. Tar and Petroleum Distillers. Benzol and Petroleum Spirit, 700 and other Gravities specially prepared for Carburetting. SOLAR OIL for Gas Making, Kerosene, &c.
Correspondence invited.
Telegraphic Address: "SADLER, MIDDLESBROUGH."

SULPHURIC ACID for Sale.
BROTHERTON AND Co., Chemical Manufacturers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

PATENTS FOR INVENTIONS.

J. C. CHAPMAN, M.I.M.E., and Fel. Chartered Inst. Patent Agents. ADVICE ON ALL MATTERS CONNECTED WITH ABOVE.
Information and Handbook on application.
70, CHANCERY LANE, LONDON, W.C.

WATER-GAS PLANT.

ENGINEERS contemplating the above are invited to communicate with the Advertiser, who is prepared to give every assistance in designing Plant of any capacity.
J. L. FEATHERSTONE, 30, Amesbury Avenue, STREATHAM HILL.

IMPORTANT.

REPAIR your old Retorts with Patent STICKFAST FIRE CEMENT. Unequalled for Repairing Inclines. Estimates for all kinds of Retort-Settings.
Write CROWTHER, Retort Setter, and Sole Maker of Stickfast Fire Cement, Manor Street, HUDDERSFIELD.

GAS TAR wanted.
BROTHERTON AND Co., Tar Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

ENRICH YOUR GAS
WITH
CHEAP BENZOL.

AT to-day's Price of Benzol, Illuminating POWER cost less than a HALFPENNY PER CANDLE.
Apply to SADLER AND Co., MIDDLESBROUGH.

SPENT OXIDE wanted.
BROTHERTON AND Co., Chemical Manufacturers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

CANNEL, COAL, ETC.

JOHN ROMANS & SON, EDINBURGH, Gas Engineers, supply all the most approved SCOTTISH CANNELS; also FIRE-CLAY GOODS, CAST-IRON PIPES, and other APPARATUS for GAS and WATER WORKS.
Prices, &c., will be forwarded on application to No. 80, ST. ANDREW SQUARE, EDINBURGH, NEWTON GRANGE, NEWBATTLE, DALKEITH, } SCOTLAND.

RENTAL CLERK (No. 3091).

THIS Situation has now been filled up.
Applicants are thanked for their trouble.

TRAVELLER, representing a Firm of Fire-Clay Retort and Brick Manufacturers, covering North and South Wales, Eastern Counties, Midlands, Shropshire, &c., during Six Months of the Year, will be pleased to hear from Firms desirous of being represented. Is open to extend ground covered.
Address No. 3093, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

ACETYLENE.

A LARGE Viennese Financial Institute, which is building Carbide Factories, wants CONNECTIONS WITH PROMINENT EXPERTS IN ACETYLENE, for the purpose of starting a new Acetylene Enterprise in Austria-Hungary. PATENTS of Acetylene Apparatus, Cleaners, Burners, especially of Table and Carriage Lamps, are required.
Please address O.P. 6433, care of Haasenstein and Vogler, Vienna, I., AUSTRIA.

WANTED, on a Water-Works a young Man as MAIN LAYER, and to make himself useful.
Apply, by letter, stating Wages, &c., to No. 3101, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Stoker in small Gas-Works (Night Shift), and to take short Lamp-Lighting Round. Must be willing to make himself generally useful. Wages 21s. per week.
Address W. C. BURLEY, Station Road, PETERSFIELD.

RETORT-HOUSE Foreman wanted. Preference given to one understanding Regenerative Furnaces and able to control Men. Wages £2 2s. per week.
Apply, by letter, to No. 3098, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Man used to Service Laying and Fixing Meters. Constant employment to a steady Man.
Apply, by letter, stating Age and Wages required, to Jos. C. INGHAM, Manager, Gas-Works, RAMSBOTTOM.

WANTED, a Man as Main and Service LAYER and FITTER, and to make himself generally useful in the Works.
Apply, with Testimonials for competency and sobriety, to Mr. BEECH, Manager, Gas-Works, KIDSGROVE.

WORKING Manager wanted for Small Works. Must state Age and Lowest Wages required.
Apply, by letter, to No. 3102, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

CLEETHORPES GAS COMPANY.

WANTED, two additional Stokers for Winter Stoking. Regular employment the Year through to capable and steady Men. Wages 5s. per Shift.
Apply to the Manager, E. J. BROCKWAY.

WANTED a Stoker used to Shovel Charging, and to make himself generally useful. (Five Retorts for eight months and Four Retorts for four months in the Year.) Must be steady. Wages 22s. per week. A permanent Situation to a suitable Man.
Apply, by letter (stating Age and enclosing *copy* of Testimonial from last Employer), to the GAS COMPANY, St. Ives, HUNTS.

GAS CARBON Wanted, not less than 4-Ton Loads.
Apply to the BRIMINGTON CARBON COMPANY, Sowerby Bridge, YORKS.

WANTED, Carbon in 4 Ton Lots, or more; also OIL CARBON.
State Price, f.o.r. at nearest Station, to No. 3031, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

FOR SALE—Lamp Columns (James Oakes and Co.'s No. 4 pattern), with Cradles, Lanterns, and Bracket-Irons complete, equal to new.
Apply to the MANAGER, Gas-Works, BEDFORD.

TWO Waller Exhausters to Sell, 8000 and 15,000 cubic feet per hour, with Valves, &c., in good working order. Cheap to immediate purchasers.
Address No. 3095, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

FOR SALE—A Second-hand (thoroughly overhauled) Vertical PUMP EXHAUSTER, with Steam-Engine (with clean Water and Liquor Pumps attached), to pass 7000 cubic feet of Gas per hour.
Apply to R. DEMPSTER AND SONS, LIMITED, Elland, YORKS.

PURIFIERS, set of Four, 12 feet square, modern make, perfect condition, 12-inch Centre Valve and Connections. Bargain, if sold this month. Sold in pairs, with 12-inch Four-way or ordinary Slide Valves, if required.
Apply, by letter, to No. 3096, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

EXHAUSTERS, pair (Donkin's) 25,000 cubic feet per hour, FOR SALE, with Engine, and four 8-inch Valves, in perfect order, £100. Sold separately, if desired.
Other sizes, new and second-hand, from 2000 to 50,000 cubic feet per hour, ready for delivery.
J. F. BLAKELEY, Gas Engineer, Ravensthorpe, Yorks.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. **Compare Prices and Particulars before ordering elsewhere.**
J. F. BLAKELEY, Gas Engineer, Ravensthorpe, YORKS.

FOR SALE, Cheap—The undermentioned GAS PLANT:—
2 PURIFIERS, 8 ft. square by 4 ft. deep, complete.
2 PURIFIERS, 5 ft. square by 4 ft. deep.
1 PURIFIER, 5 ft. square by 2 ft. 9 in. deep.
CONDENSER, 4 inches diameter, Vertical Pipes.
EXHAUSTER (Gwynne's), 20,000 c. f. per hour.
Apply to SAML. WHILE AND SONS, 60, QUEEN VICTORIA STREET, E.C.

ISLE OF THANET GASLIGHT AND COKE COMPANY, MARGATE.

TO TAR DISTILLERS AND OTHERS.

THE Directors of the above Company are prepared to receive TENDERS for the surplus TAR produced at their Works from July 1, 1898, to June 30, 1899.
For all Particulars as to quantity and terms of delivery, apply to the Manager, Mr. James Dougall.
Tenders, endorsed "Tender for Tar," and addressed to the Chairman of the Company, to be delivered at these Offices not later than Thursday, Aug. 4, 1898.
The Directors do not bind themselves to accept the lowest or any Tender.
By order,
THOS. C. FULLER,
Secretary.
Gas-Works, Margate,
July 22, 1898.

FOR SALE.

THE Directors of the Staines and Egham Gas Company have FOR SALE a 10-inch HORIZONTAL CONDENSER, a LIVESEY WASHER, a GOOD'S WASHER, a CAST-IRON SCRUBBER, 8 ft. by 24 ft.—the whole complete, with 10-inch Connections, Valves, &c. They are capable of dealing with 500,000 cubic feet of Gas in 24 hours. All in good condition, and can be removed at once. The whole to be taken down and carted from the Company's Works by the Purchaser.
Tenders for the whole as they stand to be sent to the undersigned.
THOMAS WEBB,
Manager.

BOROUGH OF ROCHDALE.

TO CHEMICAL MANUFACTURERS.

THE Gas Committee of the Corporation invite TENDERS for the supply of such quantities of BROWN OIL of VITRIOL as they may require during the ensuing Twelve Months; the Acid to be made from Pyrites or recovered Sulphur, and to be delivered at the Rochdale Railway Station.
Further Information can be obtained from Mr. T. Banbury Ball, the Manager at the Gas-Works.
Tenders, endorsed "Vitriol," must be sent to me not later than noon of Wednesday, the 3rd of August next.
By order,
JAMES LEACH,
Town Clerk.
Town Hall, Rochdale,
July 23, 1898.

THE GASLIGHT AND COKE COMPANY.

TENDERS FOR COKE.

THE Directors of this Company are prepared to receive TENDERS for the purchase of COKE, to be supplied into Barges or Railway Trucks at their Beckton, Nine Elms, and Fulham Stations within the Twelve Months ending the 30th of September, 1899.
Particulars and Forms of Tender can be obtained upon application at this Office.
Tenders to be sent in at or before noon on Wednesday, the 27th inst., addressed to me, and endorsed "Tender for Coke."
The Directors do not bind themselves to accept the highest or any Tender.
By order,
JOHN WILLIAM FIELD,
Secretary and General Manager.
Chief Office: Horseferry Road,
Westminster, S.W., July 22, 1898.

BOROUGH OF BURTON-UPON-TRENT.

NEW RETORT-HOUSE.
CONTRACT No. 17.

THE Corporation of Burton-upon-Trent invite TENDERS from competent persons for the construction and erection of a new RETORT-HOUSE and the execution of certain Works incidental thereto, at their Gas-Works in the said Borough.
Full Particulars and Copies of Conditions, Specification, and Bill of Quantities, with Form of Tender, may be obtained and Drawings inspected on payment of Two Pounds (which will be returned on receipt of a *bonâ-fide* Tender), on application to the Engineer, Mr. F. L. Ramsden, Gas and Electric Light Works, Burton-upon-Trent.
Sealed Tenders, endorsed "Tender for Retort-House," are to be delivered to me at or before Ten a.m. on Friday, the 29th day of July inst.
The Corporation do not bind themselves to accept the lowest or any Tender, nor will they pay any expense or charge relating to the making or delivery of the same.
No Tender will be accepted from any party who pays to his or their employees, whether artizans or labourers, less than the Standard Rate of Wages paid in this Borough, or who does not conform to the Hours and Conditions of Labour generally recognized in each branch of industry affected; and clauses to ensure compliance with this regulation are inserted in the conditions of contract.
T. N. WHITEHEAD,
Town Clerk.
Town Hall, Burton-upon-Trent,
July 14, 1898.

BOROUGH OF BURTON-UPON-TRENT.

NEW RETORT-HOUSE ROOF.
CONTRACT No. 18.

THE Corporation of Burton-upon-Trent invite TENDERS from competent persons for the supply, construction, erection, and fixing of a New RETORT-HOUSE IRON ROOF at the Gas-Works in the said Borough.
Full Particulars and Copies of Conditions, Specification and Bill of Quantities, with Form of Tender, may be obtained and the Drawings inspected on payment of Two Pounds (which will be returned on receipt of a *bonâ-fide* Tender) on application to the Engineer, Mr. F. L. Ramsden, Gas and Electric Light Works, Burton-upon-Trent.
Sealed Tenders, endorsed "Tender for Iron Roof," are to be delivered to me at or before Ten a.m. on Friday, the 29th day of July inst.
The Corporation do not bind themselves to accept the lowest or any Tender, nor will they pay any expense or charge relating to the making or delivery of the same.
No Tender will be accepted from any party who pays to his or their employees, whether artizans or labourers, less than the Standard Rate of Wages paid in this Borough, or who does not conform to the Hours and Conditions of Labour generally recognized in each branch of industry affected; and clauses to ensure compliance with this regulation are inserted in the conditions of contract.
T. N. WHITEHEAD,
Town Clerk.
Town Hall, Burton-upon-Trent,
July 14, 1898.

HAWORTH URBAN DISTRICT COUNCIL.

THE above Council are prepared to receive TENDERS for 2000 Tons of unscreened GAS COAL, delivered at Haworth Station.

Tenders to be sent to me not later than July 29, 1898.

WM. ROBERTSHAW,
Clerk to the Council.

Burlington Chambers, Keighley.

AMMONIACAL LIQUOR AND GAS TAR.

THE Bakewell Urban District Council are prepared to receive TENDERS for the purchase of the above during the Year ending June 30, 1899.

Delivery into Purchaser's Tanks at Bakewell Station.

Tenders, marked "Gas Tenders," to be sent, before the 2nd of August, to me

VERNON R. COCKERTON,
Clerk.

Bakewell.

THE Knutsford Light and Water Company invite TENDERS for their production of GAS TAR and AMMONIACAL LIQUOR for the Twelve Months ending July 31, 1899.

State Prices for Liquor of 5°, 5½°, 6°, 6½° and 7° Twaddel.

The Company do not bind themselves to accept the lowest or any Tender.

Tenders to be sent in on or before the 5th of August, addressed to the Chairman.

TENTERDEN GAS COMPANY.

THE Directors invite Tenders for the supply of 500 Tons of best GAS COAL, delivered at Headcorn or Appledore Stations (S. E. Railway); 400 Tons to be delivered during the months of August and September, and the remainder as and when required.

Tenders, with Analysis and full Particulars of the Coal offered, to be sent to me on or before Saturday, the 30th inst.

The lowest or any Tender not necessarily accepted.

GEO. F. VARTY,
Secretary.

Tenterden, Kent,
July 19, 1898.

TENDERS FOR GAS COAL.

THE Gas Committee of the Town Commissioners of Newry invite TENDERS for the supply of from 3000 to 3600 Tons of best GAS COAL, screened, to be delivered in such quantities as may be required by the Committee, and delivered free *ex* Ship or Steamer at Albert Basin, Newry.

The Coal to be Fresh Wrought, Dry, and free from Clench, Pyrites, or other objectionable matter for Gas Making.

Further Particulars may be obtained from Mr. A. Gibb, Manager.

Sealed Tenders, endorsed "Tender for Coal," specifying the description and quality of the Coal, and where raised, to be addressed to John Treanor, Esq., Chairman, and delivered to the undersigned not later than Eleven a.m., on Friday, the 5th of August next.

The Committee reserve to themselves the right to accept the whole or any portion of any quantity offered, and do not bind themselves to accept the lowest or any Tender.

By order,
R. H. DOHERTY,
Town Clerk.

New Town Hall, Newry,
July 22, 1898.

THE GASLIGHT AND COKE COMPANY.

NOTICE is Hereby Given, that a HALF-YEARLY ORDINARY GENERAL MEETING of the Proprietors in this Company, will be held at this Office on Friday, the 5th day of August next, at Twelve o'clock (noon) precisely, to transact the usual Business, including the declaration of a Dividend for the Half Year ending on the 30th day of June last.

Notice is Hereby also Given, that at such Meeting the Directors will apply to the Proprietors for AUTHORITY TO DISPOSE of such FURTHER PORTIONS of the COMPANY'S PROPERTY as are not now required for the purposes of their Undertaking.

Notice is Hereby further Given, that at such Meeting the Directors will apply to the Proprietors for authority to hold the next succeeding HALF-YEARLY ORDINARY GENERAL MEETING of Proprietors in the month of January, 1899, instead of in the month of February of that Year.

By order,
JOHN WILLIAM FIELD,
Secretary and General Manager.

Chief Office: Horseferry Road,
Westminster, S.W., July 19, 1898.

BOLDON GAS COALS.

ANALYSIS.

Yield of Gas per ton .	10,500	Cubic Feet.
Illuminating Power .	16·9	Candles.
Coke	66·7	Coke.
Sulphur	0·86	Sulphur.
Ash	2·04	Ash.

For Prices, &c., apply to

W. H. PARKINSON,
THE HARTON COAL CO., LTD.,
NEWCASTLE-ON-TYNE.

Telegraphic Address: "PARKINSON NEWCASTLE."

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his AUCTIONS of STOCKS and SHARES in London, Suburban, and Provincial Gas and Water Companies are held MONTHLY, at the Mart, Tokenhouse Yard, E.C.

He also undertakes the issuing by Auction of Gas and Water Stocks and Shares under Parliamentary Powers.

Terms for issuing such Capital, and also for including Gas and Water Stocks and Shares in these periodical Sales, can be obtained on application at Mr. Alfred Richards's Offices, 18, FINSBURY CIRCUS, E.C.

AUTOMATIC METER REGISTER

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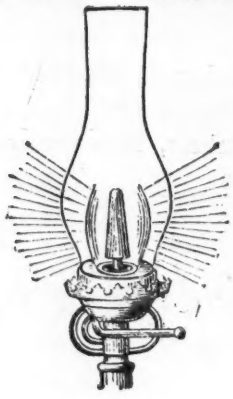

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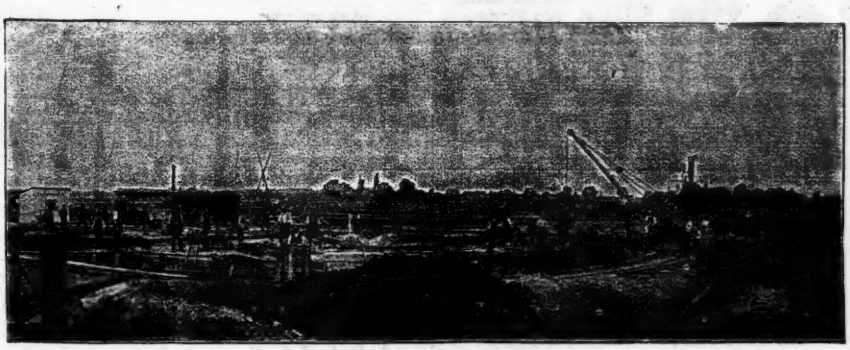

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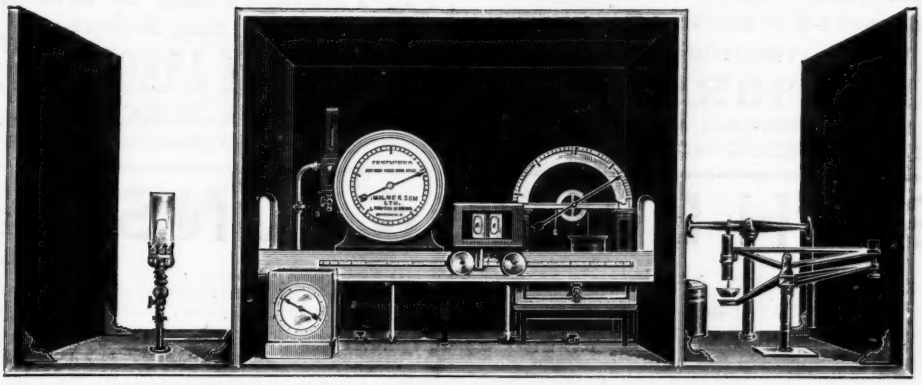

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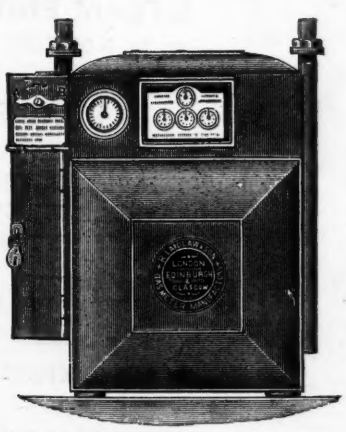

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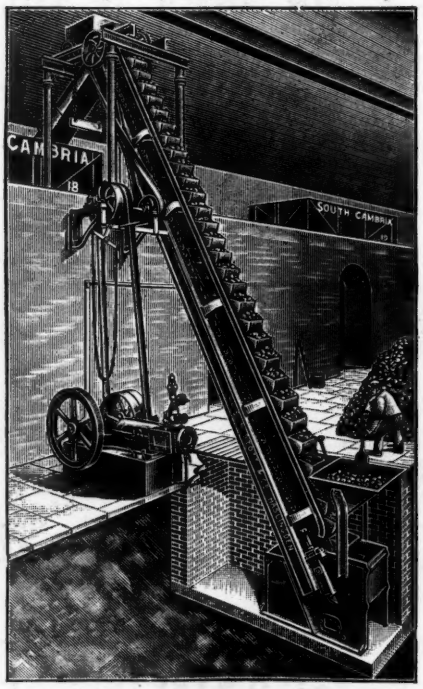

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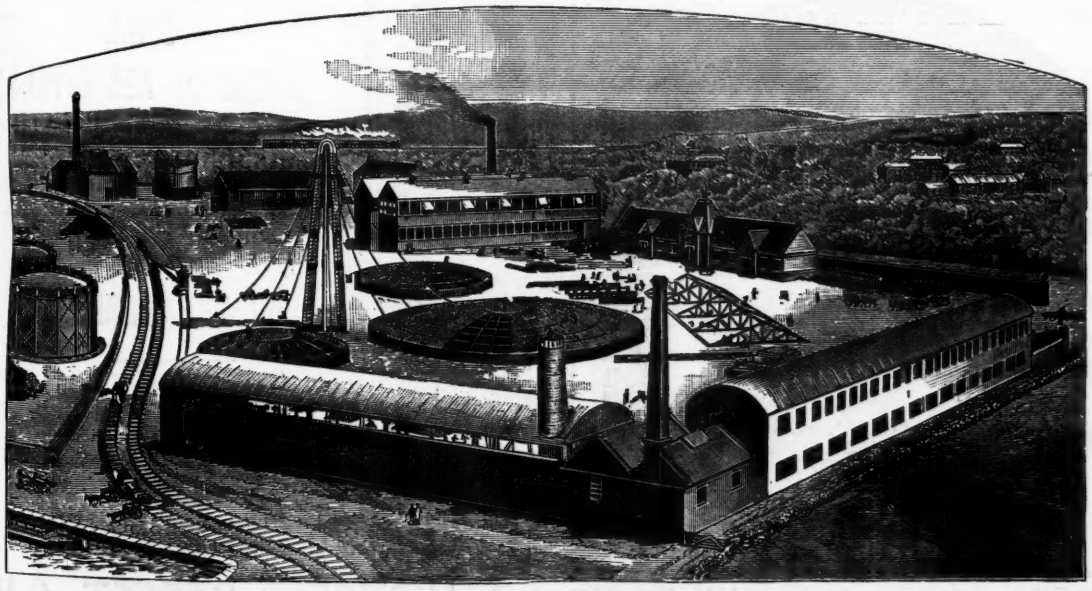

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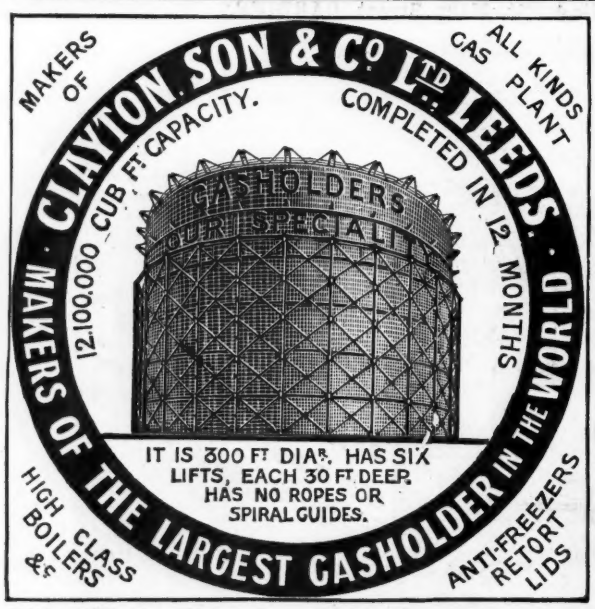
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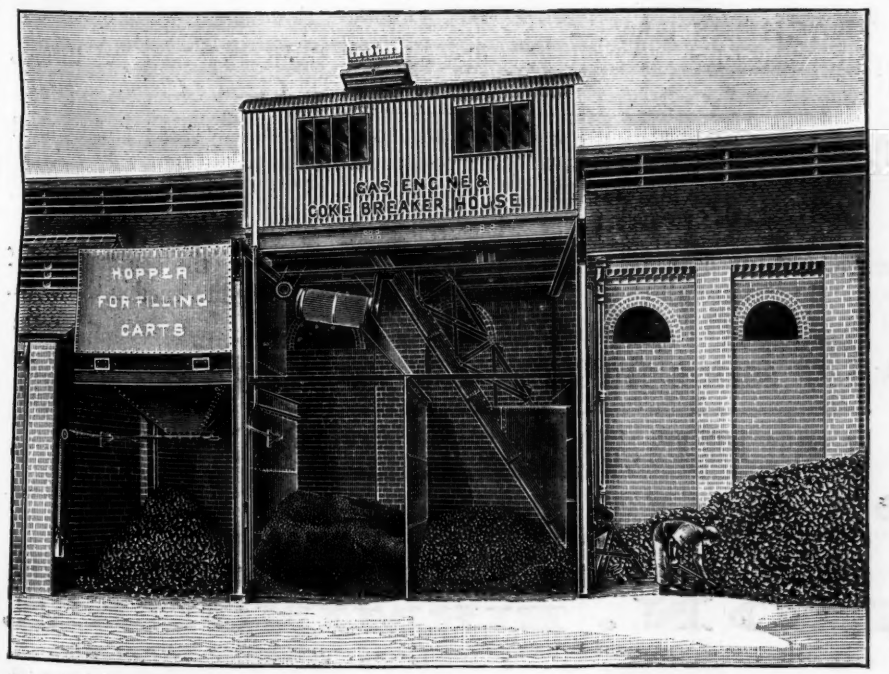

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[See also Advt. p. 192.

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